







*The*  
HOME UNIVERSITY  
ENCYCLOPEDIA



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President Franklin D. Roosevelt and Prime Minister Winston Churchill, surrounded by their army and navy, chieftains during their dramatic meeting at sea.

*The*  
HOME UNIVERSITY  
ENCYCLOPEDIA

—An Illustrated Treasury of Knowledge—

*Prepared under the Editorship of*

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WITH SPECIAL ARTICLES AND DEPART-  
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EDUCATORS AND SPECIALISTS IN THE  
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# VOLUME III

## Catskill

**Catskill Formation**, so called because first studied in the Catskill Mountains, New York, denotes a series of sandstones and shales of Upper Devonian age, seen on the northern slopes of the Appalachian Mountains. They are shallow deposits, formed at the time when the marine sediments of the Hamilton, Portage, and Chemung groups were being laid down in deeper waters.

**Catskill Mountains**, a group of mountains comprised in the Appalachian system, situated in Greene and Ulster counties, New York, with minor ramifications extending into Delaware and Schoharie counties. They cover

president since 1904, and in 1916 became president for the second time of the National American Woman's Suffrage Association. She has been twice married, to Leo Chapman (1884), and after his death to George W. Catt (1890).

**Cat Tail**. See **Bulrush**.

**Cattaro, Gulf of**, or **Bocche di Cattaro**, a large inlet of the Dalmatian coast, Austria.

**Cattell, James McKeen** (1860-1944), Am. psychologist, was born in Easton, Pa., and was graduated from Lafayette College (1880), continuing his studies at Göttingen, Paris, Geneva, Johns Hopkins, and Leipzig



*Scene in Catskill Mountains.*

an area of about 500 sq. m., with a general trend from s.e. to n.w. On the w. they are practically continuous with a high plateau of Western New York; on the e. for a distance of about 12 m., they approach to within 8 m. of the Hudson River, then descend abruptly from heights of 2,000 and 3,000 ft. into the plain below. The Catskill Mountains consist of Devonian sandstones and shales. They are well timbered with hardwood forests, and the scenery, diversified by precipices, ravines, streams, and waterfalls, is very picturesque. They contain some of the most popular resorts in the country. Consult John Burroughs' *In the Catskills* (1910).

**Catt, Carrie Chapman Lane** (1859- ), American leader of woman suffrage, was born in Ripon, Wis. She was educated in the State Industrial College of Iowa, and studied law. She has been active in the cause of woman suffrage since 1890, lecturing extensively in the United States, Europe, and many other lands. She organized the International Woman Suffrage Alliance, of which she has been

(1880-6). He was a lecturer at Cambridge University (1888), professor of psychology at the University of Pennsylvania from 1888 to 1891, head of the departments of anthropology (1896-1902) and of philosophy (1902-05) at Columbia. He was editor of *Science*, *The Psychological Review*, *The Popular Science Monthly*, and *American Men of Science: a Biographical Directory* (1906-1910).

**Cattell, William Cassidy** (1827-98), American educator, president of Lafayette College from 1863 to 1883.

**Cattermole, George** (1800-68), English water-color painter and book illustrator. He illustrated the *Waverley Novels* (1830), *Master Humphrey's Clock*, and other works.

**Cattle**. Although sometimes used in a broader sense to include horned stock, horses, and sheep, the word 'cattle' is properly applied to bovine animals belonging to the species *Bos taurus*—the domestic cow, ox, and steer. The exact origin of cattle has not been definitely known, but has been generally assigned to two wild species. Zoologically,

cattle are related to the bisons of Europe and the American plains, buffaloes, yaks, the musk ox, and the zebu, and with them form the Bovidae, or ox division of the Ruminantia. Economically, they are perhaps the most useful of the domesticated animals. Their flesh is part of the daily food of man—butter, cheese, and milk are on every table; their hides go to make leather; their hair forms part of plaster; their hoofs are used for glue; their bones for fertilizer, ornaments, and buttons, and many other purposes.

Cattle have been domesticated in Europe and Asia from prehistoric times, and are mentioned in writings at least 4,000 years old, the indications being that different types were known at that date. The tendency toward variation early made itself apparent, and this with the influences of environment, notably climate and food, resulted in a variety of types. These factors were taken account of by the ancients, although there are no indications that they reached any very high degree of development. The selection and crossing of individuals, with reference to securing a definite type or set of characteristics, has been the most potent factor in improving cattle and developing distinct breeds. The improvement of cattle in the modern sense, by selection and crossing to improve and develop distinct breeds, commenced only in the middle of the 18th century.

The principal objects aimed at by the great breeders of the latter end of the 18th century were: (1) early maturity, (2) utility of form, (3) beauty of form, (4) uniformity of type, (5) aptitude to fatten, and (6) strength of constitution. With the establishment of certain principles of breeding, other lines of improvement were undertaken, such as increased milk yield, improvement of the quality of the milk, and prolongation of the period of milk flow. The results in these lines have been no less remarkable than in the development of early maturity and beef-producing qualities. This specialization has proceeded so far that in the United States two general classes of cattle are recognized, beef cattle and dairy cattle, although between the extremes of these two groups certain breeds are recognized as dual-purpose animals, with the beef and the milking qualities both developed to considerable degree. With a single exception the breeds in the United States have been introduced from Europe, and mainly from Great Britain, although of late much attention has been given in this country to breeding for improvement. In the United States and Can-

ada cattle are classified as (1) pure bred, whose lineage is kept in public records; (2) grades or common cattle of mixed breeding, but usually possessed of some pure blood, and (3) scrubs or unimproved stock.

*Beef Cattle.*—The best type of beef cattle is squarely and compactly built, full and broad over the back and loins, possessing depth and quality particularly in these regions. The hips are evenly fleshed, the legs full and thick, the under line parallel with the straight back. The neck is full and short. The eye should be bright, the face short, the bones of fine texture, the skin soft and pliable, and the flesh mellow, elastic to the touch, and rich in quality. The muzzle should be broad and strong, indicating superior feeding capacity, and the forehead broad and full.

*Breeds of Beef Cattle.*—The principal breeds among beef cattle in America are the Aberdeen-Angus, Galloway, Hereford and Shorthorn or Durham. The *Aberdeen-Angus*, sometimes called the Polled Angus, is a black hornless breed of Scotch origin of pronounced beef qualities. These cattle are compactly built; the body is well rounded and of relatively great depth, the legs are short, the head is short and wide, the chest wide and deep, and the back broad and straight. The bulls attain a weight of 2,200 pounds and the cows of 1,400 pounds. The Aberdeen-Angus was introduced into the United States in 1873 and met with great favor, especially in the West and Middle West. It is bred also in Canada, the British Isles, France, Denmark, Germany, New Zealand, South America, and the Sandwich Islands.

The *Galloway* is also a black, hornless breed, originating in Scotland and bearing a general resemblance to the Aberdeen-Angus. The animals are smaller than the latter, shorter legged, and have a longer, more shaggy coat, which is beautifully waved. Their natural environment has made them an especially hardy breed, of excellent grazing qualities, but their milking qualities are undeveloped, and, as a rule, they do not mature as quickly as some other beef breeds. Their meat is excellent and their breeding qualities are high. Galloway cattle were brought to America at an early date, and are raised especially in the Far West and the Canadian Northwest.

*Hereford* cattle are descended from the aboriginal breed of Great Britain. Distinguishing characteristics are the white face; red body broken with white on the breast, belly, legs, and crest and tip of the tail; large,

rectangular, compact body; soft hair, often curled; and fairly widespreading horns. The legs are short and placed well under the body. Herefords are among the heaviest cattle, the males often weighing as much as 2,200 pounds and the females 1,500 pounds. They mature early, take on flesh rapidly on good pasture, and yield meat of excellent quality, the proportion of dressed meat to live weight being relatively large. They are poor milkers, often furnishing insufficient milk for their calves. The breed has many admirers in the show ring, among stock raisers, and among butchers, and is one of the best of the exclusively beef cattle. It was introduced into America in 1817, and is popular in the West and Southwest and in New England. It has met with success also in Canada, Australia, New Zealand, and the Argentine. A breed of *Polled Herefords* has recently been established, the absence of horns commending them to stockmen.

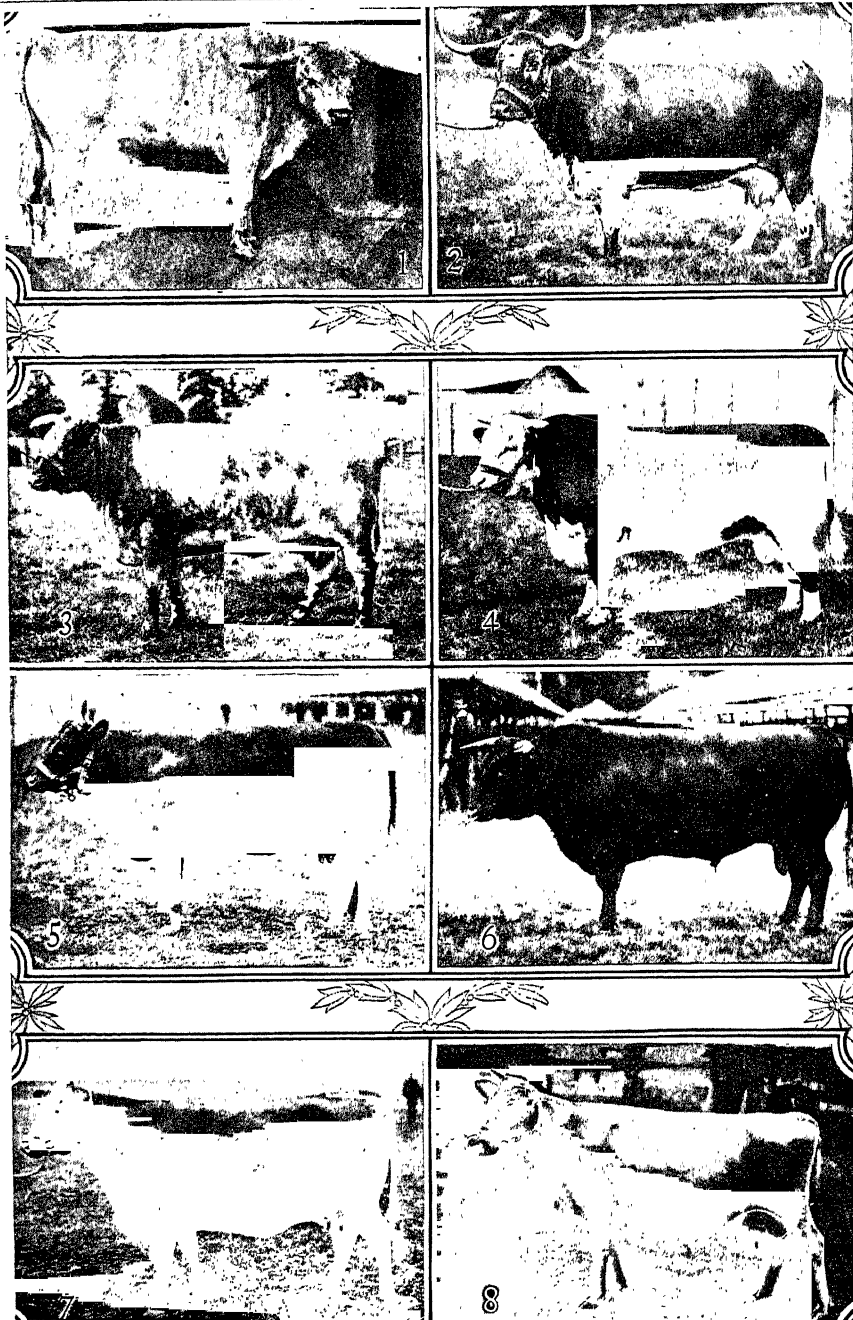
The most popular and the most widely distributed of the breeds of beef cattle are the *Shorthorns* or *Durhams*, which originated in Northeastern England, were imported into America between 1783 and 1795, and have been exported to nearly every country colonized by Anglo-Saxons, being numerous in Australia, New Zealand and Argentina, as well as in Great Britain, United States and Canada. They are a large breed in size and weight (cows 1,400 lbs.; bulls 1,800 to 2,200 lbs.), of a red, red and white, or roan color, with occasionally an all-white specimen, and compactly built, with rectangular bodies, lean, shapely heads, small short horns, and short legs. They are unsurpassed in earliness of maturity, are excellent feeders, furnish tender, juicy meat, and dress well, the proportion of bone and offal being relatively small.

The *Devons* are sometimes classed with the beef breeds and sometimes as dual-purpose animals, suited to both beef and milk production. They were formerly prized as draft animals, some of the finest oxen being of that breed, large, and of a rich red color. The breed is one of the most ancient and pure of the distinct British breeds. Profitable beef production depends upon the selection of a suitable cow herd and the use of a good purebred bull, so managed that each generation of cows is an improvement upon the preceding one. Healthy cows of strong constitution and good quality, which do well on limited feed rations, as indicated by uniform fleshing, loose, pliable skin, and glossy coat, should be selected for the breeding herd. During the

summer months the cows should be maintained largely on pasture, supplemented, when necessary, by silage or forage crops. In the early fall they may be maintained on meadows and aftermath, and later on stalk fields. Winter rations vary in different sections. Cows raised solely for breeding purposes may be fed on silage and dry roughages combined with a small quantity of protein-rich concentrates. Cows kept also for dairy purposes should be fed after the manner of dairy cattle. The rations for wintering cows in various sections of the United States may be found in *Farmer's Bulletin* 1073 (U. S. Department of Agriculture), which has been largely used in the preparation of this article.

Great progress has been made in the United States in the improvement of the cattle raised and fed for beef, by developing earlier maturity, ability to fatten well and give good return for the feed, and better dressing qualities on the block, with a larger proportion of better cuts of meat and less offal. The large stock yards recognize five definite market classes of beef cattle: (1) 'Beef Cattle,' including fattened steers suited to dressed beef-export, and shipping, and graded as prime, choice, good, medium, and common rough steers, baby beef, Texas, and Western Range cattle; (2) 'Butcher Stock,' including the better grades of heifers, cows, and bulls, and common or inferior steers which have failed to fatten satisfactorily; (3) 'Cutters and Cannery,' composed of thin cows and bulls, and inferior steers and heifers—in fact, anything of a low, inferior grade; (4) 'Stockers and Feeders;' and (5) 'Veal Calves.' All but the fourth class are slaughtering stock, and each class is divided into several grades recognized in buying and in the market quotations.

*Dairy Cattle.*—In general appearance the dairy cow shows certain market characteristics which serve at once to distinguish it from the beef stock. The body tends to be wedge-shaped rather than rectangular, the head is narrow and long, and the distance between the eyes is great. The neck should be long and thin; the shoulders thin and lithe, and narrow at the top; the back open, angular, and tapering toward the tail; the hips wide apart and covered with little meat. The leading dairy breeds in the United States are the Ayrshire, Guernsey, Jersey, Holstein-Friesian, Dutch Belted, and Red Polled. To this list must be added the Shorthorns, described under beef cattle, among which, as there stated, are some excellent milking strains. The breed



*Leading Breeds of Cattle.*

1, British Wild Bull. 2, Longhorn Cow. 3, Shorthorn. 4, Hereford. 5, Devon Cow. 6, Sussex. 7, Red-polled Cow. 8, Native Jersey.





*Leading Breeds of Cattle.*

9, Guernsey Cow. 10, Galloway Bull. 11, Aberdeen Angus. 12, Ayrshire. 13, Highland. 14, Welsh Cow. 15, Kerry Cow. 16, Dexter.

has been represented in some of the largest competitive breed tests, and has made an excellent showing.

*Ayrshires*, named for the county of Ayr, in Scotland, where the breed originated, are of medium size (bulls 1,400 to 1,800 lbs.; cows 900 to 1,100 lbs.), red and white spotted, shortlegged, fine boned and of sprightly appearance. They are believed to be of mixed ancestry. The cows have excellent grazing qualities, doing well on a wide range of scanty pasture or upon coarse forage, but respond promptly and profitably to liberal feeding. Ayrshires are large and persistent milkers. A yield of 5,500 lbs. a year, as an average for a working herd in good hands, is often realized. The Guernseys and Jerseys are Channel Island breeds, the parent stock of which was derived to considerable extent from Normandy, and were long known in this country as Alderney cattle. While the origin of the two breeds is practically the same, more of the characteristics of the parent stock of Normandy have been retained in the *Guernseys*. They are rather larger than the Jerseys, stronger boned and coarser. They are light in color, yellow predominating, often with large patches of white on the body and legs. Darker shades, approaching brown, are found on some cows and are quite common on bulls. The skin is of a rich yellow color, suggesting richness of milk, which in fact has a higher color at all seasons than that of any other breed. The horns are white or amber. Guernsey cows give a liberal milk yield, and the milk is uncommonly rich in fat (4.68 per cent.) being especially well suited to butter production. They have great power of assimilating food and converting it into milk, although they will not generally bear much forcing. Guernsey cattle are raised chiefly on their native island of Guernsey, and in England, the United States (New England, New York, Pennsylvania, New Jersey, Wisconsin) and Canada.

*Jersey* cattle have exceeded the Guernseys in popularity in America, as judged by their number and distribution, and are unquestionably the most popular dairy cattle in the country, probably outnumbering all the other dairy breeds combined excluding the *Holsteins*. The Jersey is small (cows 850 lbs.) and deer-like in form, lean and muscular, intelligent and gentle in disposition, with a handsome head and large, bright eyes set wide apart. The color varies from creamy white to fawn, tan, mouse-color, and all shades of brown to deep black. With all these

colors there is usually considerable white, distributed in large patches. The milk is exceptionally rich (5.61 per cent. butter fat) and of a deep golden color, and the yield is often large. In the United States an attempt has been made to increase the yield of milk, with much success. The cows are noted for persistence in milking, making a long season of profit, with great evenness of product until near the close of lactation. Jersey cattle are widely distributed, being adaptable to varying conditions of climate and environment.

The *Holstein-Friesians*, commonly called *Holsteins*, are second only to the Jerseys in popularity in the United States, where they were introduced by the early Dutch colonists of New York. They are black and white cattle, from North Holland and Friesland, the exact origin of which is not definitely known, although the breed is one of the very oldest of the dairy breeds. The animals of both sexes are large sized—the largest of the dairy breeds, which, with their black and white markings, gives them a striking appearance. The black and white are never mixed, and are quite irregularly distributed. The cattle have great constitutional vigor, mature early, are heavy feeders, and produce a large quantity of milk of rather low fat content. Cows giving 40 to 60 lbs. of milk a day are regarded as average animals, and an average of 7,500 to 9,000 lbs. a year is expected from a good herd. There are numerous records of 100 lbs. a day for several days in succession, and of 20,000 to 30,000 lbs. a year.

*Dutch Belted* cattle are black and white cattle from Holland, and white being in the form of a belt around the center of the body. They have never come greatly into favor in America. Other dairy breeds which may be mentioned are the hardy French Canadian, somewhat resembling the Jersey breed, natives of Quebec, where they are chiefly raised, and the Kerry, from Western Ireland, a small hardy breed not widely distributed.

*Raising Dairy Cattle.*—In raising dairy cattle good healthy cows, showing the best characteristics of their class and with a milk-production record of 6,000 pounds or more, should be bred to the best pure-bred bull that can be obtained. The cows may be pastured during the grazing season and stabled during the winter months; the soiling system may be employed, by which they are kept more or less closely confined throughout the year and furnished with green crops; or a combination of the two systems may be used,

pasturage being supplemented by silage in the late summer. A grain ration is also desirable, and an abundance of pure water if the cows are to be in good condition for parturition and heavy milking. See also DAIRYING.

In the improvement of cattle for dairy purposes the chief points aimed at have been early maturity, the lengthening of the period of lactation, economical use of the feed, and good return for it in the yield and richness of milk. In all of these respects very remarkable changes have been effected, and some highly developed types have been produced. The improvement is still going on within the breeds and among the grade animals, the dairymen now realizing the importance of selecting their cows with reference to economy of production. This selection and weeding-out process has been greatly promoted by the perfection of the Babcock test (see MILK) for the fat content—a simple test which the ordinary dairyman can use and which requires little time. This, with the extension of the practice of keeping records of the individual cows, has placed milk production on a strictly business basis. The great breed tests carried on at Chicago, Buffalo, St. Louis and other places in connection with international expositions, together with the extensive work of the agricultural experiment stations, have done much to standardize the grades of milk, butter, and cheese. *Dual-purpose or general purpose cattle*, as the name implies, combine beef-producing and milk-producing qualities. They are more massively built than dairy cattle, but lack the breadth and smoothness of the purely beef cattle. There are three breeds of importance in America: Brown Swiss, Polled Durhams, and Red Polled.

The *Brown Swiss* is the best known of the Swiss breeds in the United States. It is regarded by some authorities as a distinctly dairy breed, although it is rather fleshy. It is medium in size (cows 1,300 to 1,400 lbs.) small boned, and has a fine, silky coat, varying in color from a mouse-color and brownish dun to darker shades, with the head, neck, legs and quarters nearly black. The cows give a good flow of milk, which holds out well, and is well up to the medium in quality (3.3 per cent. butter fat). This is probably the most popular of the continental breeds in Europe, and is rapidly coming into favor in the United States and Canada on account of its merits.

The *Polled Durham* breed originated in the United States more especially in Ohio, the Shorthorns being the basis. The animals re-

semble the Shorthorns in size, color, and general appearance, but are hornless. They are often classed among the beef breeds, but many of them have considerable dairy excellence. In this respect they practically duplicate the 'milking Shorthorns.'

The *Red Polled* is a comparatively new breed, originating in the counties of Norfolk and Suffolk, England. These animals resemble the Devons almost as closely as the Polled Durhams resemble the Shorthorns, yet the two breeds are probably not closely related. They stand well up toward the head in popularity among the dual-purpose breeds in the United States. They rank well both as beef producers and as milkers. A yield of 5,000 pounds of milk a year is not uncommon; the percentage of butter fat is about 3.8.

All of the above breeds of cattle are represented in this country by associations which register thoroughbred animals and issue herdbooks in addition to promoting the general interests of the breed. See BREEDING.

Cattle are subject to a large number of diseases attacking the respiratory, digestive, and generative organs. Only the most important of these can be touched upon in this work.

*Bovine Tuberculosis*.—One of the most important of the bacterial diseases of cattle, both from the point of view of the farmer and breeder and of the general public, is tuberculosis. The farmer may lose some of his herd by death, while others, though appearing quite well, may prove, when slaughtered, to be so badly infected as to be unfit for food. The chief danger to the community at large is of infection through milk, from infected cattle, which may contain the disease germs in enormous numbers. Bovine tuberculosis is an infectious disease, caused by the tubercle bacillus, and characterized by the formation of tubercles or nodules—small grayish-yellow bodies, which may exist in almost every organ, and give rise to numerous disease processes which vary according to their situation. Its occurrence is favored by poor ventilation, overcrowding, insufficient air space, and all conditions hostile to general health.

'Tuberculin,' a glycerine extract from pure cultures of tubercle bacilli, is the most reliable diagnostic agent. Injected subcutaneously, it produces a distinct rise of temperature in tuberculous animals, while in cattle free from tuberculosis it produces no effects. Preventive measures include the provision of an open-air life for cattle wherever possible, ample ventilation, and good sanitary conditions in cowsheds. *Foot-and-mouth dis-*

*ease (Aphtha epizootica)* is an acute infectious disease which attacks all ruminating animals, though horses and dogs less readily, and occurs also in man. Germany, France, and other European countries have frequently been ravaged by it, but outbreaks in the United States have been quickly suppressed. For symptoms, treatment, and preventive measures, see FOOT-AND-MOUTH DISEASE.

*Rinderpest*, or *Cattle Plague* is the most fatal of all cattle diseases. It is highly infectious, and attacks only ruminating animals. It has been known since the 4th century, its original habitat having probably been the steppes of Southern Russia. It has been estimated that during the first half of the 18th century, 200,000,000 cattle died in European countries from rinderpest. For some years the disease has played havoc with the cattle in South Africa, the last serious outbreak having occurred in 1902. It has been observed in various parts of America.

*Pleuro-pneumonia Contagiosa*.—Contagious pleuro-pneumonia of cattle is a disease peculiar to the bovine race, and cannot be transmitted to other animals. It has been known since the 17th century, and consists of an infectious inflammation of the lungs and pleura. The mortality is from 30 to 50 per cent. From 1860 to 1892 this disease prevailed in the United States. It was finally eradicated in 1892, and has not occurred in this country since that date.

The cattle industry has reached a high state of development in the United States. The quality of the stock kept is improving, and more attention is paid to securing stock adapted to the purpose for which it is kept, and especially the needs of the butcher. The open range of the West is practically gone, although there are extensive areas held by cattle-men under fence. The breeding stock on these large ranches has been greatly improved, and this is reflected in the better grade of cattle received at the stockyards. For information as to the cattle industry in any given year, see reports of the Department of Agriculture. In connection with this article, see also DAIRYING; MILK; BUTTER; CHEESE; MEAT; PACKING INDUSTRY; FEEDING STUFFS; also the general article on STOCK RAISING and the special sections on *Stock Raising* in the articles on the various countries of the world; also the numerous *Farmers' Bulletins* and Publications of the Bureau of Animal Industry on this subject.

**Catullus, Gaius Valerius** (c. 87-c. 54 B.C.), the greatest lyric poet of ancient Italy,

was born in Verona. His years were spent mainly at Rome, where he settled about 62 B.C. In Rome he became intimate with the two Ciceros, and Lucretius, and there he met the lady whom, under the name of Lesbia, he celebrated in verses which stand at the head of the lyric poetry of passion. Catullus' poems consist of 116 pieces, mostly of short length. Among his longer compositions are *Epithalamium Pelei et Thetidos*, *Coma Berenices*, and *Attis*. Consult: W. Y. Sellar's *Roman Poets of the Republic*.

**Catulus**, Roman family of the Lutatian clan. GAIVS LUTATIUS CATVLVS was proconsul at the time of the first Punic War. QVINTVS LUTATIUS CATVLVS was consul in 102 B.C., and in the next year, as proconsul, succeeded, along with Marius, in annihilating the invading hordes of the Cimbri at Verzellæ. QVINTVS LUTATIUS CATVLVS, son of the above, was consul in 78 and censor in 65 B.C. He opposed, in 67 and 66 B.C., the laws which conferred unusual powers on Pompey; was a keen opponent of Cæsar; and applauded Cicero's action in suppressing the conspiracy of Catiline. He died in 60 B.C.

**Cauca**, department of Colombia, extending along the Pacific coast from the Gulf of Darien to the frontier of Ecuador. Area 20,403 sq. m. It is mountainous, being traversed throughout its length by the Western Cordilleras of the Andes. The river valleys in the western part are hot, damp, and unhealthy, but the Cauca valley in the central eastern part has a generally healthful climate and an exceedingly fertile soil in which tropical crops flourish. The department is rich in minerals, gold, silver, platinum, copper, salt, coal, and iron being found in the Cauca valley. Coffee, tobacco, cacao, sugar, and fruits are raised; the sugar and coffee being of excellent quality. Popayán is the capital; p. 211, 756.

**Cauca**, river of Colombia, which, rising in the Andes; 700 m. long and is navigable for a large part of its course. Its valley is exceedingly fertile.

**Caucasian**, or **Caucasic Race**, a name given to the white race of mankind, as distinguished from the brown, yellow, and black, by Blumenbach, who, since the finest skull in his collection was Georgian, accepted the Caucasian as the highest type of the Indo-European stock. While the name is in reality a misnomer, since the peoples of the Caucasus do not fairly represent this highest branch of the human family, it has nevertheless been universally applied to the fair type of man

as opposed to the black or yellow. Keane, in his *Man: Past and Present* (1920), gives the range of the Caucasian peoples as all extra-tropical habitable lands except China, Japan, and the Arctic zone and inter-tropical America, Arabia, India, and Indonesia. He divides them into three types; Mediterranean, Nordic, and Alpine. The first type includes most Iberians, Corsicans, Sards, Sicilians, Italians; some Greeks; Berbers, and other Hamites; Arabs and other Semites; some Hindus; Dravidians, Todas, Ainus, Indonesians, and some Polynesians. The Nordic type includes Scandinavians, Northwest Germans, Dutch, Flemings, most English, Scotch, some Irish, Anglo-Americans, Anglo-Australians, English and Dutch of South Africa; Thrako-Hellenes, true Kurds, most West Persians, Afghans, Dards and Siah-posh Kafirs. The Alpine type is composed of most French, South Germans, Swiss and Tyrolese; Russians, Poles, Czechs, Jugoslavs; some Albanians and Rumanians; Armenians, East Persians, and Galchas. For the characteristics of the race see ETHNOLOGY. Recent studies are leading in many cases to new methods of division and subdivision.

**Caucasus**, a region of s.e. Europe occupying the isthmus lying between the Black and Caspian Seas, with an area of 181,173 sq. m., formerly a part of the Russian Empire. The main range of the Caucasus mountains, which is the most striking natural feature of the region, divides it into two parts, Ciscaucasia in the North and Transcaucasia in the south. Ciscaucasia is generally level, an extension of the Russian plains, with many marshes and lagoons, but Transcaucasia is rugged and mountainous, traversed by parallel chains of the great mountain system. The chief rivers are the Kuban and Terek in the n. and the Rion and Kura in the s. The climate, while generally healthful, is exceedingly varied, as is also the vegetation. In the n. it is sparse and poor, but in the central part magnificent forests clothe the mountain slopes, and still farther south figs, chestnuts, pomegranates, and almonds flourish. The mineral wealth is great, but is as yet little developed. Petroleum wells are numerous, the Baku fields being one of the world's great oil sources. From 300 to 600 millions poods of petroleum is the annual output of the Baku wells, (a pood being a Russian measure of weight amounting to 36 pounds). Mineral springs occur in many places; and coal, copper, iron, lead, sulphur, manganese, salt and some gold are found. Agriculture is the chief occupation. Cereals, tobacco, cotton, and vines are raised. Mul-

berry trees are grown, and silk culture and wine making are of importance. The nomad tribes are occupied in cattle-grazing; the native peoples make rugs, woolen cloaks, and silver-trimmed articles, but manufacturing is in a primitive condition. Grain and petroleum are the chief exports.

An important military road was constructed by the Russians through the pass of Dariel Gorge, at a height of 8,000 ft. above sea level, connecting Vladikavkaz and Tiflis, chief towns of the two great sections of the Caucasus. The history of the region through all its later centuries was of the Russian attempts to gain control, frustrated whenever possible by Turkish opposition and by the desire of the inhabitants for independence. This was inevitable from its location as a buffer between Europe and Asia. Peter the Great began this conquest; by the end of the 18th century most of Ciscaucasia was under Russia, but it took 30 years and more of fighting during the middle of the 19th century for the conquest of the mountain tribes.

During the World War, the Caucasus became one of the great Eastern battlegrounds, with Turks and Russians in conflict and Great Britain taking a part. In 1914, 1915, and 1916 the campaigns went on between Turks and Russians, with the taking of Erzerum by Russia in February, 1916, as a notable strategic victory. In 1918 the British took Baku, in order to forestall a German advance in the direction of India, but later withdrew.

The Russian Revolution of 1905 had made the Caucasians strive again for self-government; the Revolution of 1917 revived this spirit. The Caucasus was then established as a unit of the Union of Socialist Soviet Republics, with the title of "Transcaucasian Federated Soviet Republic," containing the three republics of Azerbaijan, bordering on its west side on the Caspian Sea; Georgia, bordering on its eastern front on the Black Sea; and Armenia. The republics are governed by a Central Executive Committee at Tiflis. Consult Freshfield's *Exploration of the Caucasus*; Abercomby's *A Trip through the Eastern Caucasus*; Baddeley's *The Russian Conquest of the Caucasus*; Graham's *A Vagabond in the Caucasus*.

**Caucasus Mountains**, a lofty mountain chain, generally considered to be the boundary line between Europe and Asia, stretching from the Taman peninsula in the Black Sea to the Apsheron peninsula in the Caspian Sea, an extent of nearly 750 m. The higher and central part is formed of parallel chains

averaging 12,000 ft. in height, connected by elevated plateaus, traversed by narrow fissures of extreme depth. The range towers far above the snow-line, which here is between 10,000 and 11,000 ft. South of the main ranges, and separated from them by the valleys of the Kura and the Rion, is a series of lower ranges known as Little Caucasus.

**Caucus**, in politics, a meeting of supporters of a definite line of policy for the purpose of choosing representatives who will express their views, or of deciding upon some change of political creed. The term is also applied to the informal and secret meetings of party leaders, who seek, in advance of regular conventions or primary elections, to determine the course of such conventions or elections. In the legislative bodies of the states, as well as in the Federal Congress, the caucus of all the members of a party is often employed to secure unity of party action. The name is said to be derived from an Indian word used to describe the meetings of Captain John Smith with the Indian Council (1609).

**Cauda-galli Grit.** See **Corniferous Period**. One of the New York formations belonging to the Devonian series.

**Caul**, a part of the amnion or fetal membrane; receives this name when a child is born with it covering the head, instead of with the head piercing it, as is generally the case. To be born with a caul was, and in some places still is, considered lucky.

**Cauliflower.** The cauliflower is, like the broccoli, a cabbage in which the flower stems and abortive flowers have been artificially developed. The crop grows best in a cool, moist climate.

**Caulking, or Calking**, the process of driving oakum (or old ropes untwisted and pulled asunder) into the seams of a ship's planks, in sides or decks, and covering it with pitch or rosin, to make the vessel tight.

**Caulopteris**, a name given to certain fossil tree-ferns. Some of them were of large size; it is believed that they may have been 40 ft. and more in height. They are especially characteristic of the Carboniferous formation, in which certain coal beds are practically entirely made up of the trunks of tree-ferns.

**Cause.** The Aristotelian doctrine of causation recognized four kinds of causes—material, formal, efficient, and final. Thus, in the case of a house, the stone and wood are the material cause, the plan of the house the formal cause, the builder the efficient cause, and the shelter which the house is intended to afford the purpose or final cause of its

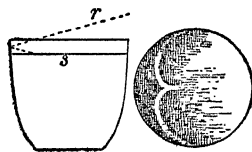
construction. In the case of organic or living things, to which probably Aristotle's scheme was primarily applied, the form—that is to say, the principle of life—is immanent, present, from the beginning (though undeveloped), and is, moreover, when fully realized, itself the end or final cause of the organism. So the formal and the final cause are here coincident and identical, while the efficient cause becomes merely the first impulse from without that starts the process of immanent self-development.

The modern scientific doctrine of cause and effect is concerned primarily with mechanical processes, the fundamental feature being the uniformity of succession exhibited. If a set of conditions which happen in sequence, that is, in order, as a, b, c, are followed by another set of conditions, as 1, 2, 3, it is assumed that the first set, if repeated will on every other occasion be followed by a similar second set. Upon this general assumption the methods of physical science are based. Such are the inductive methods which are analyzed from the philosophical standpoint by John Stuart Mill and David Hume. See also **LOGIC**.

**Causerie** (Fr.), an article dealing informally with matters of literary interest, a short essay. The best known are the *Causeries du Lundi* of Sainte-Beuve, where, however, the causerie, like the essay, belies its humble title, and has become a very elaborate production.

**Caustic**, in chemistry, a term used for certain substances which have a corrosive action. The word is used as a prefix to 'potash,' 'soda,' and 'lime,' indicating respectively the hydroxide of potassium and of sodium, and the oxide of calcium.

**Caustic** is the name given to the curve or surface of maximum brightness formed by the concentration of rays of light after they



*Caustic.*

r, Ray of light; s, surface of liquid.

have been reflected from a reflecting surface, or refracted a new medium. One of the simplest and most familiar examples is the caustic formed on the surface of tea or coffee

when light from a window or a flame falls on it after reflection from the polished interior side of the cup. The two-arched curve formed in this way separates the surface into two regions, on one of which no reflected ray whatever falls. All such rays pass through the other region, and every ray is a tangent to the caustic curve. Each point of the caustic may, therefore, be regarded as the meeting-point of two consecutive rays at least. Where the two caustic arches meet there is a comparatively great concentration of rays, so that this point, known as the focus, is much brighter than other parts of the caustic. Caustics may also be produced by rays which have been refracted; and here, because of the dispersion of the differently colored constituents of white light, beautiful color effects are frequently observed. Each ray forms its own caustic, slightly displaced from the caustic formed by a ray of a different color, so that the appearance is that of a colored band. A very good example of this is the ordinary rainbow.

**Cautery** (Gr. 'burner'), is an instrument for the application of dry heat to the body tissues, so as to cause marked local irritation or even destruction of tissue, according to the degree of heat applied, and the time for which it is applied. The actual cautery is heat directly applied through a heated metal instrument, as Corrigan's button. The degree of heat is decided by the effect desired. Black heat acts as a counter-irritant; dull red heat is counter-irritant, besides destroying tissue locally. An instrument applied at a bright red heat destroys tissue, but does not form a good seal for stopping hemorrhage. White heat forms no eschar at all, and so cannot be used to stop hemorrhage; and a white-hot wire practically cuts like a knife. Antisepsis must be secured, both in the surface to be cauterized and in the instruments, before the operation is performed. For the recent application of hot air and sun rays as cauterizing agents, it is claimed that no mechanical injury is done to the tissues, that healing is more satisfactory, and that scarring is much less.

**Cauto River**, the largest riv. in Cuba. Rising in the mountains n. of Santiago de Cuba, it flows w. through a course of 120 m., 75 of which are navigable, to the head of the Golfo de Guacanabo.

**Cauvery**, riv., India, rising in the mountains of Coorg, flowing through Mysore (where it descends in beautiful falls and rapids round the island of Sivasamudram) and Madras for about 475 m., to empty itself by

means of one of the largest deltas in India into the Bay of Bengal.

**Cava dei Tirreni**, town and episcopal see, Italy, in the province of Salerno; a favorite resort in the warmer months. A little to the south is the famous Benedictine monastery of La Trinità della Cava, founded in 1025, containing valuable archives, now the property of the nation. The chief industry is the manufacture of textiles; p. 8,691.

**Cavaignac, Jacques Marie Eugène Godefroy** (1853-1905), French public official, son of Louis Eugène Cavaignac; under-secretary of war in 1885, and minister of marine in 1892. As minister of war in Brisson's cabinet (1898), he played a prominent part in the Dreyfus affair, but upon the discovery of the Henry forgery, he resigned rather than countenance a new trial of Dreyfus.

**Cavaignac, Louis Eugène** (1802-57), French soldier and politician, was born in Paris. He served with distinction in Algeria. In the revolution of 1848 he was recalled to Paris, where, as minister of war and dictator, he drove the insurgents from the barricades in a series of sanguinary engagements. He was a candidate for president of the republic, but was defeated by Louis Napoleon. Consult *Life* by Deschamps.

**Cavaillon**, town, France, in the department of Vaucluse. The culture of silk worms is a flourishing industry; p. 8,991.

**Cavalcanti, Guido** (c. 1255-1300), Italian poet, author of ballads and pastorals, was born in Florence of a Guelph family. He was a warm friend of Dante, who dedicated to him his *Vita Nuova*, and who refers to him in the *Inferno*, the *Purgatorio*, and the *De Vulgari Eloquentia*. Consult Rossetti's *Dante and his Circle*.

**Cavalcaselle, Giovanni Battista** (1820-97), Italian author and art critic, was born in Legnago. Having taken part in the Italian revolution of 1848, he was obliged to seek refuge in London. There, in collaboration with Joseph Crowe, he prepared *Early Flemish Painters* (1857), which is still a standard work. After his return to Italy, he published his *History of Italian Painting* (1864-71), and biographies of Titian (1877) and of Raphael (1863).

**Cavalier**, a horseman, whence a knight, a gentleman. The name is perhaps most familiar as applied to the followers of Charles I. of England. It survived until the struggle over the Exclusion Bill in 1679, when it gave place to Tory. See also CHEVALIER.

**Cavalieri, Emilio del** (c. 1550-c. 1602),

Italian composer. He was one of the earliest advocates of instrumental accompaniment and one of the first to employ vocal ornament, such as *tremolo*. His work comprises four musical dramas, one of which is regarded as the first Italian oratorio.

**Cavalla**, more correctly **Kavala**, seaport, Greece, on the Gulf of Cavalla (Ægean Sea). It is in a rich tobacco growing district, and large amounts of that commodity are exported. Cavalla formerly belonged to Turkey but was allotted to Greece at the close of the Balkan War. It was the birthplace of Mehemet Ali; p. 22,939.

**Cavalotti, Felice** (1842-98), Italian writer and politician, was born in Milan. He joined the forces of Garibaldi, opposed the monarchy, and as editor of the *Gazzettino* proved himself a thorough democrat and radical.

After 1930 there were further experimental changes. The question of the future of the cavalry units of the army was much discussed after World War I. The answer was found in the combination of forces, especially armored car divisions and aircraft units with the cavalry, the latter for quick survey, the former for advance operations and support. These were known in the service as half-and-half or 'Portee' cavalry. For the historical development of Cavalry, see ARMY.

Pres. Roosevelt, Feb. 28, 1942 ordered reorganization of the War Dept. and the Army. At that time 10 combination cavalry regiments existed. Cavalry mechanization was announced as having been completed in April, 1942.

**Cave Animals**, a term used in zoology in two senses—first, and most legitimately, for fauna living in caves, animals which have



*United States Cavalry in Action.*

**Cavalry**, soldiers organized and armed with rifle, pistol, and sabre, mounted on horses, and trained to fight either on horseback or on foot. As an arm of the military service it has been exceedingly important in the past, but it is of less value in modern warfare, in which battles take the form of struggles for the possession of trenches, forts, and other fixed positions. When operating with other troops, the duties of the cavalry are, in general, to cover the movements of their own troops, to secure information of the movements of hostile troops, to break up the hostile advance, to make raids, and to seize and hold advanced positions. During combat, it operates against the hostile flanks, takes advantage of breaks in the enemy's lines, fills up gaps that may occur in its own lines, and acts as a highly mobile reserve. After battle, its duties are to pursue and harass the enemy or, if its own troops are defeated, to cover their retirement.

been structurally modified to fit them for this mode of life; second, as a convenient designation of various mammals of which fossils are found in Pleistocene deposits in European caves, to distinguish them from their living allies. In this latter sense we speak of the cave bear, the cave lion, and the cave hyena, though these were not in any special sense cave-dwelling animals. The true cave dwellers are usually much modified in accordance with their habitat, especially as regards eyes and coloring. The conditions which obtain in the larger caves are not unlike those at great depths of the sea; and in the partial or complete suppression of eyes and the development of special tactile organs the members of the two faunas show a marked resemblance. An amphibian resembling the common frog has been found in caves in Texas. It has concealed eyes and is colorless. Other cave animals include fish, notably the famous blind fish *Amblyopsis* of the Mammoth Cave in



Kentucky; beetles, such as the carabids; carnivorous grasshoppers. Consult Packard's *Cave Fauna of North America*.

**Caveat**, (Latin, 'let him beware'). is a formal notice given to one holding public or judicial office, that he is not to perform a certain act without first giving intimation to the caveator or person giving the notice.

**Caveat emptor** ('let the purchaser beware') is a principle of modern commercial law, which requires a buyer to make an inspection on his own account of the articles he is purchasing, and in the absence of an express warranty frees the seller from any claim on the ground that certain faults were not pointed out.

**Cave Dwellings.** See **Cliff Dwellings**; **Mound Builders**; **Troglodytes**.

**Cavell, Edith** (1865-1915), British nurse, received her training as a nurse in the Lon-



*Statue of Edith Cavell.*

don Hospital. After holding various hospital positions, she was in 1907 appointed matron of the Berkendael Medical Institute, Brussels, a training school for secular nurses, which, following the outbreak of the Great War, became a Red Cross hospital. While continuing her work in the hospital Miss Ca-

vell was active in assisting allied soldiers to escape, by means of false credentials, across the Dutch frontier. In August, 1915, she was arrested by the German police, and having admitted the charges against her, was found guilty and was shot as a spy, Oct. 12, 1915. In May, 1919, after a memorial service in Westminster Abbey, her body was removed to Norwich cathedral.

**Cavendish**, pseudonym of **Henry Jones**.

**Cavendish, Lord Frederick Charles** (1836-82), English statesman, secretary from 1859 to 1864 of Lord Granville, member of Parliament, private secretary to Gladstone, 1872, and treasury official, 1873 to 1882. He was assassinated in Dublin on the day that he took office as chief secretary to the Lord Lieutenant of Ireland, an act for which Irish malcontents were later punished.

**Cavendish, George** (?1500-1561), biographer of Wolsey, married a niece of Sir Thomas More. About 1560 he wrote his *Life of Cardinal Wolsey*, one of the most interesting short biographies in the English language.

**Cavendish, Henry** (1731-1810), English natural philosopher, was born in Nice, France, and devoted his life to scientific investigations. As a philosopher he is entitled to the highest rank. In 1760 he discovered the extreme levity of inflammable air, now known as hydrogen gas—a discovery which led to balloon experiments and projects for aerial navigation; and later he ascertained that water resulted from the union of two gases. The famous *Cavendish Experiment* was an ingenious device for estimating the density of the earth. Cavendish also wrote on astronomical instruments and his *Electrical Researches* (1771-81) were edited by Clerk Maxwell. Consult Wilson's *Life*.

**Cavendish, Thomas** (1560-92), English navigator. He shared in Grenville's expedition to Virginia (1585). In 1586 he sailed from Plymouth with three ships, and by way of Sierra Leone and Brazil reached the Strait of Magellan. During his cruise in the Pacific he burned three Spanish towns and numerous ships. He returned by way of the Indian Archipelago and the Cape of Good Hope to England—completing his circumnavigation of the globe in 1588.

**Cave of the Winds.** See **Niagara River and Falls**.

**Caves**, natural depressions in the earth's crust, formed by the action of such agencies as air, water, and volcanic upheavals. According to the method of their formation, caves may be divided into several groups

The sea caves, so numerous on rocky coasts, are the result of the action of the waves, which, casting sand and gravel against the cliff, have gradually undermined it. In this process the air, too, plays an important part; driven by the pressure of the advancing water into every crevice of the rock, it suddenly expands and dislodges showers of fragments when the wave falls back. In this way a cave is often carried far beyond the limits reached by the waves themselves, and may tunnel upward, emerging at the surface at a considerable distance from the edge of the cliff. Such 'blow holes,' sending out puffs of spray with every wave of a storm, are frequent on rocky shores. An even greater number of caves are due to the action of spring water and underground rivers dissolving the rocks in which they circulate. As limestone is of all common rocks the most soluble in spring water containing carbonic acid, caves occur oftenest in this rock. Familiar examples of such caves are the Mammoth Cave and other caves of Kentucky; the Luray Cavern of Virginia; the Adelsberg Grotto in Carniola. In extensive tracts of limestone the rivers may flow entirely in underground channels, while the surface is an arid desert, as in the Causses in Central France. These channels are a succession of vaulted chambers, with pillars and pendent columns deposited by the water dripping from the roof (see *STALACTITES* AND *STALAGMITES*); or the roofs may fall in, leaving circular sinks in the ground above.

Another group of caves, which may be better described as rock shelters, is found in inland cliffs, where hard and soft beds alternate. The soft layers are readily eaten back by the action of frost and rain, forming shallow recesses. Lava caves are characteristic of volcanic regions and are due to the escape of the central part of a lava flow at a period when the surface cooled to form a hard crust, while the interior was still liquid. Not only have natural caves frequently been the refuge of primeval man and of many of his descendants, but there gradually developed the practice of artificially improving and elaborating such shelters, and ultimately of hewing out habitations in what was previously solid rock. The cave temples of India are probably the finest illustrations of this custom. The cliff dwellings of Arizona are also partly cut out of the rock. Consult Shaler's *Sea and Land*; Lubbock's *Origin of Civilization*; Hovey's *Celebrated American Caverns*.

**Caviare**, the salted roe (immature ovaries)

of the sturgeon considered a table delicacy. In the United States eggs of fish other than sturgeon are prepared as caviare; the product must, however, be labelled with the name of the fish used.

**Cavite**, province, Luzon, Philippine Islands, bordering on Manila Bay; area 510 sq. m. It is mountainous but fertile; the principal products being sugar, rice, coffee, and indigo; p. 157,355.

**Cavite**, city, Luzon, Philippine Islands, 9 m. s.w. of Manila, the chief naval station of the archipelago; captured by Jap., 1942; p. 22,169.

**Cavour**, Count Camillo Benso di (1810-61), restorer of Italian unity and nationality, was born in Turin, then capital of Sardinia, a descendant of one of the ancient noble families of Piedmont. In 1847, in conjunction with Count Cesare Balbo, Cavour established a newspaper, *Il Risorgimento*, in which he advocated a representative system of government, somewhat after the English pattern. Serving successively as Minister of Agriculture and Commerce, Minister of Marine and Minister of Finance, in 1852 he was appointed to succeed D'Azeglio as Premier, and from this time devoted himself to bringing about the unification of Italy. He greatly improved the financial condition of the country, introduced measures of free trade, consolidated constitutionalism, weakened clerical influence, and made Sardinia a power of some account in Europe.

It was through Cavour's influence that Sardinia took part in the Crimean War, and as a result he managed to bring the Italian question before the Congress of Paris in 1856. From this time on his aim was to drive other powers, especially Austria and France, out of Italy. He lived to see Victor Emmanuel king of a united Italy, with a first Italian parliament in Turin in 1861. Consult *Lives of Cavour* and Orsi's *Cavour and the Making of Modern Italy*.

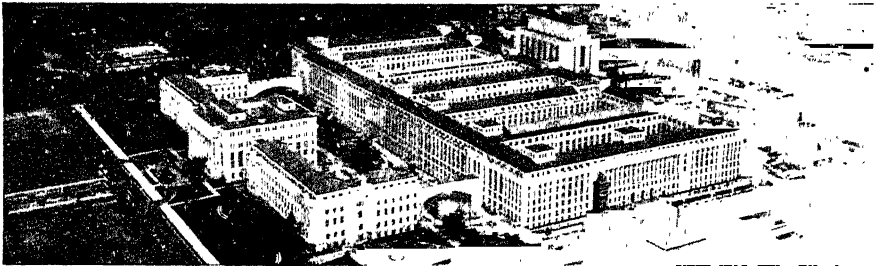
**Cavy**, a small rodent of the family Caviidae found in South and Central America. The true caviars are small animals, with short legs and ears and a complete absence of tail; the wild forms, uniformly colored, live chiefly in burrows excavated by themselves and are timid and shy. Cutler's Cavy, almost black in color, is generally thought to be the ancestor of the domesticated guinea pig.

**Cawdor**, a village, Scotland; the traditional scene of Duncan's murder (Shakespeare's *Macbeth*) in 1040, but the castle dates only from 1454; p. of par. 838.

## GOVERNMENT AGENCIES IN ACTION



Broad-base terraces, with a loose rock lined outlet, designed by the Soil Conservation Service as a measure for preventing soil erosion.



U. S. Department of Agriculture from the Washington Monument. Left: Administration Building and East and West Wings; right: South Building.



Dusting a cotton field in the South with calcium arsenate from an airplane for boll weevil control.



Part of the fire-ridden area where CCC boys from the Lompoc, Arroyo Grande and Pinto Lake camps fought to control a fire which blackened and laid bare 2430 acres of mountain land adjacent to the Santa Lucia National Park.

**Cawein, Madison Julius** (1865-1914), American poet, was born in Louisville, Ky. In 1887 he published his first book, *Blooms of the Berry*. Other volumes include: *Red Leaves and Roses* (1893); *The Garden of Dreams* (1896); *Myth and Romance* (1899); *Kentucky Poems* (1902); *Nature Notes and Impressions* (1906); *The Shadow Garden* (1910); *The Republic* (1913); *The Cup of Comus* (1914).

**Cawnpur**, or **Cawnpore**, chief city of the district of Cawnpore, United Provinces, India, on the s. bank of the Ganges. The British maintain a large military cantonment here and have made the city the commercial center of Northern India. Cawnpur was the scene of tragic events during the Sepoy Mutiny of 1857, when women and children of the European garrison were massacred; p. 216, 436.

**Caxton, William** (c. 1421-91), the first English printer, was born near Hadlow in Kent. He was apprenticed to a mercer in London, at whose death (1441) he left England, and settled in Bruges. In 1474, with the co-operation of Colard Mansion, a printer of Bruges, he issued his *Recuyell of the Histories of Troye*, the first book printed in English, followed in 1475 by *The Game and Plays of the Chesse*. Returning to England in 1476, Caxton set up a printing press near Westminster Abbey and for 15 years he assiduously printed chivalric romances, religious works, and translations, all of which he edited and 22 of which he translated. His books, numbering 99, all printed in black letter, included Malory's *King Arthur*, translations of Cicero's *De Senectute* and *De Amicitia*, and editions of Chaucer, Lydgate, and Gower. Consult *Life and Typography of William Caxton* by William Blades.

**Cayenne**, capital of French Guiana (South America) and the only port in the colony. It is the seat of a college. It was once the site of a penal settlement. The Isle du Diable, on which Dreyfus was incarcerated, lies 30 m. to the n.w.; p. 10, 146.

**Cayenne Pepper**. See **Pepper**.

**Cayley, Arthur** (1821-95), English mathematician at Cambridge. In 1882 he visited the United States, where he lectured in Johns Hopkins University. Cayley contributed to nearly every subject in the range of pure mathematics. Specially noteworthy are his theories in analytical geometry in regard to curves and surfaces, and his memoir on matrices in the development of branches of al-

gebra. As a writer he is best known by his *Elementary Treatise on Elliptic Functions* (1876).

**Caylus, Anne Claude Philippe de Thiébaut, Comte de** (1692-1765), French engraver and archæologist. He was an accomplished etcher, producing an enormous number of plates, some of which are valuable as preserving the works of celebrated artists. He was also an archæological explorer of note.

**Caymans**, or **Cayman Islands**, three islands in the Caribbean Sea; 180 m. n.w. of Jamaica, of which they form a dependency. They are of coral formation and are very fertile. Good fishing grounds surround them, and great natural caves extend under their shores; p. 5, 253.

**Cayuga**, lake of glacial origin in the central part of New York State, stretching n. and s. for 35 m., with a maximum breadth of 2 to 3 m., and an elevation of 381 ft. It drains n. to Lake Ontario by the Seneca and Oswego Rivers. The city of Ithaca stands at its head.

**Cayuga**, a tribe of North American Indians belonging to the Iroquoian confederation. They formerly lived near the shores of Cayuga Lake, New York, but at the beginning of the American Revolution a large number of them removed to Canada and never returned.

**Cayuse**, tribe of North American Indians, formerly living near the Umatilla River, Oregon, and in Washington. They are noted for their bravery. They now number about 300, all on the Umatilla Reservation, Oregon. Their name has been given to a breed of Indian pony, a fact of interest because they are said to be the tribe which first introduced the horse among North American Indians.

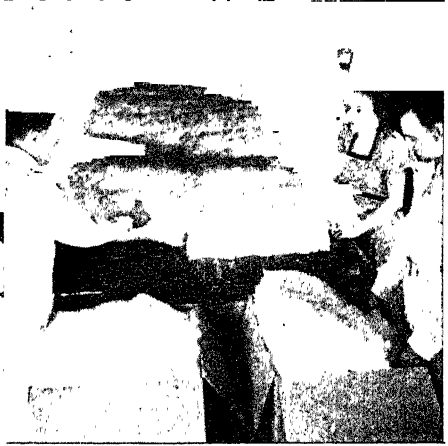
**Cayvan, Georgia Eva** (1860-1906), American actress was born in Bath, Me. Her first appearance was in *Pinafore*, in 1879. The following year she appeared at the Madison Square Theater, New York. She played in San Francisco and other cities, and from 1887 to 1894 was leading lady in Daniel Frohman's Lyceum Theatre Company.

**Cazin, Jean Charles** (1841-1901), French landscape painter, was born in Samer (Pas-de-Calais). After obtaining his degree at the University of Lille, he went to England, where he interested himself in ceramic designing. He returned to France and painted chiefly landscapes. His best known works are *The Flight into Egypt*, *The Journey of To-*

## A NEW ERA FOR GLASS



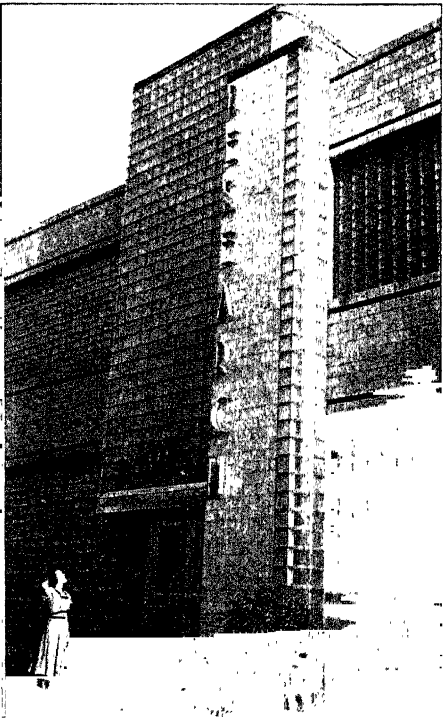
Weaving pure glass into cloth! Water and soap are used to clean this material.



Glass made in fluffy snow-white packs for use as insulation for mechanical refrigerators, as fire, vermin and moisture proof insulation.



A machine which assembles spools of glass thread into lustrous skeins as soft and sheer as silk.



A Modern Building of Glass.

*bias*, *The Departure of Mary and Joseph from Judæa*, *Hagar and Ishmael*, *A Dead City*, *The Marne*, *The Bathers*.

**CCC**, Community Credit Corporation; Civilian Conservation Corps. See UNITED STATES, NEW DEAL.

**C. E.**, abbreviation for civil engineer; Christian Endeavor.

**Ceanothus**, a genus of small American trees or shrubs of the Buckthorn family. They are cultivated chiefly for ornamental purposes and are more commonly found on the Pacific coast. *C. thyrsiflorus*, known as the California Lilac, bears clusters of fragrant blue flowers like miniature lilac blooms.

**Ceará**, state, Brazil, on the Atlantic coast; area 40,241 sq. m. The leading industries are cotton spinning and rubber manufacture. The capital is Fortaleza; p. state, 1,319,228.

**Cebes**, a Theban, a disciple of the Pythagorean philosopher Philolaus, and also of Socrates, at whose death he was present. Plato, in his *Phædo*, which describes Socrates' last hours, makes him the most important character, after Socrates, in the dialogue.

**Cebidæ**, a family of monkeys entirely confined to South America, and including the capuchins, howling monkeys, spider monkeys, woolly monkeys, and others.

**Cebu**, one of the Philippine Islands, 139 m. long and 24 m. wide, with an area of 1,695 sq. m. A mountain chain extends along its greater axis. Rainfall is abundant, and the soil is fertile, producing sugar, hemp, tobacco, rice, and cotton. Coal, silver, lead, and petroleum have been discovered, and there are forests of building woods. The island is famous for its cheese; p. 855,065.

**Cebu**, town, Philippine Islands, capital of the province of Cebu, on the eastern coast, has one of the finest harbors in the Philippines. Features of the town are the cathedral, with a tower of white coral; the picturesque old fort; the episcopal palace, and the 'Rizal,' a small building containing a cross reputed to have been planted in Cebu by Magellan, who is said to have died on Mactan Island (1521). It was the capital of the islands from 1565 to 1571; p. 65,502.

**Cech, chek, Svatopluk** (1846-1908), one of the foremost of the Czech poets, was born in Ostredac, and educated in Prague. He is at his best in epic poems, such as *Adamité* (1873). Another collection of poems was published in 1880, including *Europe* and *The Circassian*. Cech also wrote the novels *Providky*, *Arabesky* a *Humoresky*, and *The*

*Candidate for Immortality* (1884). He founded the review *Kvety*.

**Cecidomyiidæ**, or **Gall Gnats**, a family of minute flies often destructive to crops. The best known is the Hessian Fly.

**Cecil, Lord Edward Herbert** (1867-1918), British soldier (D.S.O.), was the fourth son of the third Marquis of Salisbury. In the campaign, 1898, which led to the reconquest of the Sudan he was aide-de-camp to Kitchener, and took part in the battles of the Atbara and Khartum. On the outbreak of the Boer War (1899) he took a leading part in the defence of Mafeking, under Baden-Powell. He was Under-Secretary of State for Finance in Egypt, 1905-12, and from that time till his death was financial adviser to the Egyptian government.

**Cecil, Robert**. See **Salisbury, Marquis of**.

**Cecil, Robert, Viscount Cecil of Chetwood** (1864- ), British statesman, son of the third Marquis of Salisbury, was private secretary to his father during the latter's premiership (1886-8), was member of Parliament, 1906-1923; for East Marylebone (1906-10) and for the Hitchen division of Herts (1912-23); was Under-Secretary for Foreign Affairs (1915-16); Assistant Secretary for Foreign Affairs (1918), and Minister of Blockade (1916-18). In 1919 he went to Paris to assist in the formation of the League of Nations, of which he was later vice-president and at whose first assembly (1920) he represented South Africa. In 1924 he was awarded the Wilson Foundation prize for his efforts towards international peace. He was created a peer, taking the title Viscount Cecil of Chetwood, in 1923.

As one of Europe's ranking elder statesmen, Cecil struggled unceasingly to strengthen the League of Nations, to reduce armament and to promote world peace. He adhered to Woodrow Wilson's belief in "open covenants of peace, openly arrived at" and when Sir John Simon went to see Adolf Hitler in 1935 Cecil expressed his doubt of the value of private conversations as contributions to the cause of European amity. In 1933, he became permanent president of the governing board named by James G. McDonald, High Commissioner for German Refugees. Read his *Autobiography*.

**Cecilia, Saint**, the patron saint of music, a Roman maiden of noble family who is said to have been martyred under Alexander Severus, about 230 A.D. Cecilia has been regarded as the inventor of the organ, and in paint-

ings is generally depicted as seated at that instrument, attended by angels or saints; notable examples are the paintings of Raphael, Carlo Dolci, Rubens, Domenichino, Reynolds, and Copley. Her festal day is November 22.

**Cecropia**, a genus of soft-wood, milky-juiced trees belonging to the order Moraceæ, found in most tropical regions. *C. peltata*, the best known species, also known as the Trumpet Tree or Snakewood, is native to the West Indies and South America.

**Cecrops**, the mythical founder and first King of Athens. To him are attributed the institution of marriage, abolition of human sacrifice, and establishment of a purer worship.

**Cedar**, a genus of beautiful coniferous trees with persistent foliage and large spreading branches. There are three closely allied species, *Cedrus atlantica*, a native of North Africa. *C. deodora*, found in the Himalayas; and *C. libani* or the Cedar of Lebanon. Cedars furnish a valuable timber, light, durable, and easily worked. It is supposed to be the shittim wood of the Bible. In the United States the name cedar is applied loosely to species of *Cedrela*, *Juniper* and *Chamæcyparis*. The *White Cedar* (*Chamæcyparis thyoides*), found along the Atlantic seaboard, is really a cypress. It grows in swampy ground to a height of from 40 to 80 ft., and its timber is used for interior finishing, barrels, fences, boats, and small woodenware. The so-called Red Cedar (*Juniperus virginiana*) is a species of juniper found e. of the Rocky Mountains. It has fragrant red wood, soft and easily worked, which is used for pencils, chests, interior finishing, and fence posts. See also JUNIPER.

**Cedar Bird.** See Waxwing.

**Cedar Creek, Battle of**, a battle of the American Civil War, fought on Oct. 19, 1864, at Cedar Creek, a small stream in the Shenandoah Valley, Va., the last engagement in Sheridan's campaign against General Early in the Shenandoah Valley. Sheridan had gone to Washington to confer with the Federal authorities, leaving Wright in command, when Early surprised his army, at first driving it in some confusion before him for about 4 m. Sheridan, having reached Winchester on his return from Washington and hearing the firing, hastened on horseback to the scene of action, and reformed the Federal lines; and his disheartened troops, inspired with new enthusiasm by the presence of their popular commander, routed the Confederates. Sheri-

dan's ride from Winchester to the battlefield is commemorated by Thomas Buchanan Read's poem, *Sheridan's Ride*.

**Cedar Falls**, city, Iowa. Black Hawk co. Pershing Way, Red Ball Route, Grant Highway, Black Diamond Trail, and the Short Line and Iowa Park Highways all pass through Cedar Falls. The city is the seat of the Iowa State Teachers' College, and has



*A Cedar of Lebanon*

the Sartori Public Library. The abundant water power is utilized in manufacturing lumber, furniture, canned vegetables, farm gates, cereals, flour, and agricultural implements; p. 9.349.

**Cedar Gum**, a yellow transparent resin used in making varnish and in various medicinal preparations. It is obtained from *Lal-litris arborea*.

**Cedar Mountain, Battle of**, a battle of

the American Civil War, fought on Aug. 9, 1862, at Cedar Mountain, Culpeper co., Va., between a Confederate force of about 20,000 under Gen. 'Stonewall' Jackson, and a Federal force of about 8,000 under Gen. N. P. Banks. General Banks, at first threw the Confederates into confusion, but was finally beaten back and defeated.

**Cedar Rapids**, city, Iowa, Linn co., on the Cedar River, the seat of Coe College (1881). The city's valuable water-power accounts for its rapid growth. Industrial establishments include packing houses and foundries, and manufactures of pumps, farming implements, corn products, and cereals; p. 62,120.

**Cedar Waxwing**. See **Waxwing**.

**Cedula**, a Spanish word derived from the Latin *schedula*, 'a small piece of paper.' It may designate a certificate of indebtedness, a promissory note, a government security, or any one of numerous other certificates. The term is often applied to South American securities.

**Cefalù**, town and episcopal see, Sicily, in the province of Palermo. The most striking feature of the town is the Norman cathedral, erected in the 12th century, and containing some remarkable mosaics. Sardine fishing is the chief industry; p. 14,341.

**Cehegin**, town, Spain, province of Murcia. It produces cereals, wine, hemp, honey, and great quantities of esparto, of which paper is made. There are black marble quarries in the vicinity; p. 13,313.

**Ceiling**, the covering of an interior wall surface, more particularly of the underside of a floor, which provides the roofing or enclosure at the top of a room or other space below. In the ancient Egyptian temples and palaces the ceilings were flat and covered with a coating of plaster which allowed decoration in geometric designs. The Babylonians inclined to vaulted ceilings covered, like the walls with stucco, brilliantly colored. Arched ceilings were used by the Romans, though the flat were more common. In Byzantine architecture the ceilings were richly embellished with mosaics of bright color. Ceilings of churches in the Middle Ages were often painted and brilliantly gilded. The older ceilings generally followed the line of the roof timbers, which, in the Early English and Decorated, were often arranged so as to give the shape of a barrel vault. In the Perpendicular style, the ceiling often consists of a series of flat surfaces formed on the timbers of the roof. They are enriched with ribs, dividing them into square panels, with bosses

or flowers at the intersections. Wooden ceilings are sometimes formed like stone-groining, with ribs and bosses, as at York, Winchester, and Lincoln. In the Elizabethan age ceilings were generally of plaster. See also **Fresco** and **Mural Decoration**.

**Ceiling Price**. A maximum price fixed by Federal, State or local authority.

**Celakovsky**, or **Czelakowski**, **Frantisek Ladislav** (1799-1852), Bohemian poet and philologist, was born in Strakonitz. He was educated in the University of Prague, and held the chair of Slav philology at Breslau and at Prague. His works include collections of folk-songs and poems, notably *Rüze Stolista* ('Rose with a Hundred Leaves') and *Ohlas Pisni Ruskych* ('Echoes of Russian Songs'). Among numerous translations which he made was a version of Scott's *Lady of the Lake*. His son, **LADISLAV CELAKOVSKY** (1834-1902), was professor of botany at the university of his native town of Prague from 1871 to his death.

**Celandine**, a term applied to two very dissimilar plants. One, the greater celandine (*Chelidonium majus*), known also as swallow-wort, belongs to the order Papaveraceæ, and is a perennial plant, bearing stalked umbels of small yellow flowers and soft, irregularly pinnate leaves; whereas the lesser celandine (*Ranunculus Ficaria*) belongs to the order Ranunculaceæ, and is a perennial plant, bearing bright yellow, buttercup-like flowers in early spring, the petals being about nine in number. The leaves are heart-shaped.

**Celebes**, a singularly shaped island in the Dutch East Indies, lies e. of Borneo, being separated from it by the Strait of Macassar. It consists of a long, narrow backbone stretching n. to s., from which similar long narrow octopus-like arms point e., n.e., and s.e. Professor Alfred Russel Wallace believed that Celebes is a framework which is gradually growing into the full roundness of another Borneo; Professor O. Peschel, on the other hand, regards it as the skeleton of a once larger island. Gold is found, and sulphur is plentiful in Minahassa. The people are mostly Malays, Buginese, and Indonesians. The total area is about 70,000 sq. m. P. estimated at 1,870,000. The Dutch established factories on the island shortly after the middle of the 17th century. It was occupied by the Japanese early in 1942.

**Celebes Sea**, the division of the Pacific which lies between Celebes, Borneo, and the Philippines, in the E. Indies. It has been sounded to a depth of 13,040 ft.



**Celery** (*Apium graveolens*), is a native umbelliferous plant occurring wild in the temperate countries of Asia and Europe, in moist places, usually by the sea. The plant is hardy and is extensively grown in the United States and Canada for its blanched leaf stalks. Deep, loose, fertile soils, produce the greatest yield of celery, though the best quality is grown on loamy uplands. Between 50 and 60 varieties are cultivated in the United States.

**Céleste, Madame** (?1814-82) French actress, born in Paris. She came to the U. S. when quite young, and made her début at the Bowery Theatre, New York, 1827. Her first appearance in London was at the Queen's Theatre. After a tour through Italy, Germany, Spain, and Scotland, she paid a second visit to the United States, 1834-7.

**Celestina**, celebrated Spanish comedy (1502; new ed. 1900), is properly a dramatized novel. It appeared in English translation in 1631, and was reprinted in 1874 by Dodsley in *A Select Collection of Old English Plays*.

**Celestine, or Celestinus**, the title of five Popes: I. (422-432), II. (1143-4), III. (1191-8), IV. (1241- died 16 days after his election), V. (1294). Under Celestine I. St. Palladius and St. Patrick were sent to Ireland. Celestine V. was the founder of the orders of the Celestine Monks and the Celestine Hermits.

**Celestines**, a branch of the Benedictine order who practised special austerities. Founded by Pietro da Murrone (1254), they were known as Murronites until his elevation (1294) to the papacy as Celestine V. The Celestine houses were numerous in Germany till the reformation, and in France till 1766.

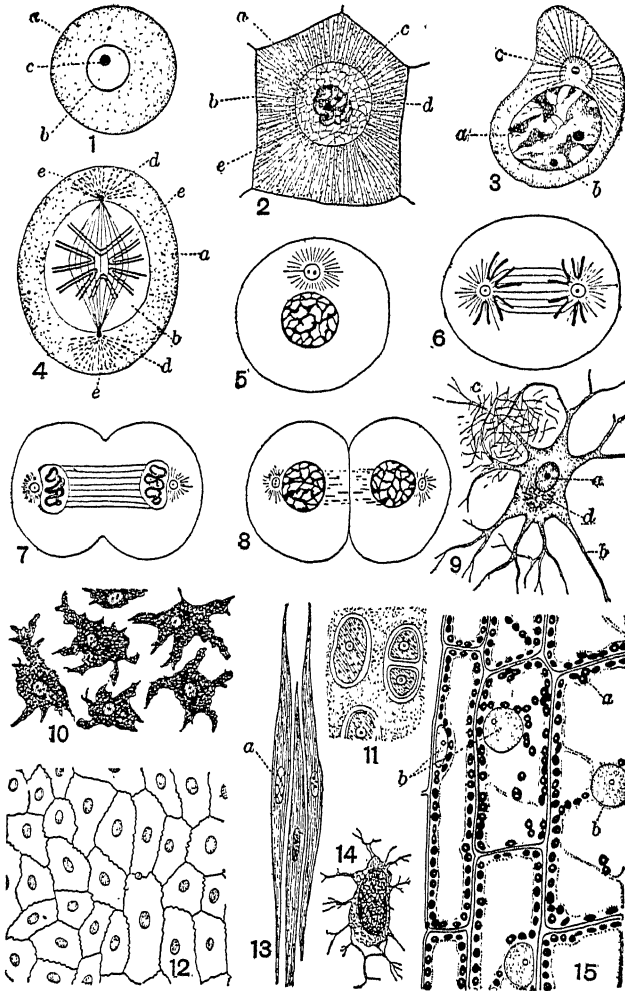
**Celestite**, a mineral consisting of sulphate of strontium, and belonging to the same group as barytes. Celestite is colorless, white, or bluish, the occasional sky-blue color, being the source of the name. Although not one of the commonest minerals, it is by no means rare, and finds a limited commercial employment as a source of strontium compounds and in the refinement of sugar.

**Celibacy**, abstention from the married state by men, as a social and secular phenomenon, depends on the distribution of population according to age and sex and economic conditions. It has sometimes been regarded with disfavor, especially in countries where there is compulsory military service. As a religious observance celibacy has held a prominent place in two world religions—Buddhism and Christianity. The earliest Christian celibates were not ecclesiastics but hermits and

anchorites, and only gradually was celibacy enjoined upon the active clergy. The law of celibacy has never been accepted by the Eastern or Greek Church; and Rome itself, in the United Greek Church, tolerates a married clergy, although no married priest can become a bishop. Since the Council of Trent, in 1563, pronounced for celibacy in the strongest manner, it has been strictly enforced as a law and obligation. In the ritualistic movement in the Church of England and the Protestant Episcopal Church in the United States, celibacy has been praised as a virtue and claimed as a duty by some advocates, but it has not, of course, been enforced as an obligation of the church.

**Cell** is a mass of protoplasm containing a nucleus, both nucleus and protoplasm having arisen through the division of the corresponding elements of a pre-existing cell. Microscopic in form, the cell is a physiological but not a structural unit. A typical cell is spherical in form; but this shape is rarely retained in multicellular animals, where the cells are usually subjected to pressure, except in the case of egg cells. In spherical cells the nucleus occupies an approximately central position. Structurally, this nucleus is to be regarded as a specialized portion of the protoplasm, and it is therefore convenient to use the term protoplasm to designate both the substance making up the cell body and that constituting the nucleus, the terms cytoplasm and karyoplasm being employed respectively for these two forms of protoplasm.

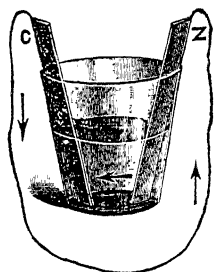
The nucleus, without which the cytoplasm is incapable of continued existence, is separated from the surrounding cytoplasm by a nuclear membrane, and is also of a complicated structure, but differs markedly from the cytoplasm. It exhibits an irregular reticulum composed of two different elements—first, of a substance called linine, apparently related to cytoplasm; and second, of the exceedingly important substance called chromatin. This stains very darkly with many dye-stuffs, whence its name, and its importance is shown by the fact that it is handed on from generation to generation. It contains a large amount of a phosphorous-containing substance called nucleine. Within the nucleus there are often bodies called nucleoli, which may be made of an aggregation of chromatin, or may be plasmosomes ("true nucleoli"), whose nature and function are not well known. Finally, the meshes of the nuclear reticulum are filled up by what is known as nuclear sap.



*Types of Cell.*

1. Typical cell: *a*, protoplasm; *b*, nucleus; *c*, nucleolus. 2. Cell from the intestinal epithelium of a worm, showing reticular structure: *a*, membrane of cell; *b*, protoplasm (cytoplasm); *c*, membrane of nucleus; *d*, achromatic substance of nucleus (karyoplasm); *e*, convoluted chromatin filament. 3. White blood corpuscle (leucocyte) of salamander: *a*, nucleus; *b*, nucleoli; *c*, attraction sphere. 4, 5, 6, 7, 8. Cells in various stages of mitotic division. 9. Ramified nerve cell from spinal cord: *a*, nucleus and nucleolus; *b*, axis-cylinder process (cut short); *c*, basket-work ramifications; *d*, pigment granules. 10. Pigment cells from the choroid coat of the eye. 11. Cartilage cells. 12. Cells of pavement epithelium from a serous membrane. 13. Muscle cells from intestine: *a*, nucleus. 14. A bone cell. 15. Vegetable cells, containing chloroplasts (*a*); *b*, *b*, nuclei. (All greatly magnified.)

The third important element of the cell is the centrosome, a minute body, either double or single, and is surrounded by an 'attraction sphere' or by a radiating aster. Only discovered in 1875, the centrosome is still inadequately known. It has been regarded as the centre of force in the cell, and is of great importance in cell division. In many plant cells, other cell organs exist in the form of plastids, which, like the nucleus, are capable



*Simple Cell.*

of growth and division, and are handed on from generation to generation. The most important of these are the chloro-plastids, or chlorophyll corpuscles, and the starch-forming leuco-plastids. As a rule, the cell membrane, or cell wall, is only slightly developed in animal cells, but it is often thick and highly important in the cells of plants, where it is formed of the carbohydrate cellulose. When cells have reached their limit of growth division takes place, the process, in the majority of cases, being of an exceedingly complicated nature. In a cell about to divide the nuclear membrane disappears, the chromatine increases in staining power, and takes on the form of a stout coiled thread. This thread, or skein, breaks up into loops, and the loops form a central star. Meanwhile the centrosome has divided into two, and these two take up positions at the poles of the cell, each being surrounded by a radiating aster. From one centrosome to another there run fine non-staining (achromatine) threads, which constitute the nuclear spindle. On these achromatine threads the chromosomes, or loops of chromatine, lie, and each splits into two. The halves then separate from one another, traveling along the achromatine threads to the poles of the cell, so that, in place of the original central aster, two daughter asters arise, one at each pole. From these daughter asters nuclei are constituted, the cytoplasm divides, and the cell division is complete. To the whole process

the name of karyokinesis, or mitotic division, is given. In a few cases—e.g. in many Protozoa—cells divide directly, without any karyokinetic process, the parent nucleus becoming constricted in the centre so as to form two new nuclei. As previously indicated, the cells which are usually taken as typical are the sex cells, which are easily obtained free from other cells. The cells which constitute the tissues of multicellular animals differ markedly from such typical cells, the differences depending upon their adaptation to serve special functions. Thus, a striped muscle fibre is a greatly elongated cell, made up of a number of slender longitudinal fibrils, marked with stripes, or alternating bands of light and dark substance; and a nerve cell may have many elongated processes extending outwards from the cell body. In the Protozoa the single cell performs all the animal functions, but in the Metazoa there is much histological division of labor, and this is reflected in the structure of the cells. See E. B. Wilson's *The Cell in Development and Inheritance* (3d ed., 1925).

**Cell, Voltaic, or Primary Battery.** A voltaic cell is any combination of metallic and liquid conductors capable of supplying a steady current in a circuit of which it forms a part. In all cases chemical action is the source of the energy. A good voltaic cell should be of high and, as far as possible, of constant electro-motive force; should be free from polarization, and of low internal resistance; should be quiescent on open circuit; should give off no fumes when in action; should be cheap, durable, not liable to rapid exhaustion, and easily renewed. No single cell meets all these requirements. For an ordinary commercial purpose, however, tolerable efficiency in one or two particulars is generally sufficient. The different kinds of cells in use fall into a few well-defined classes, the chief differences being in the various devices adopted to obviate polarization.

*The Simple Cell.*—A plate of copper *c* and a plate of zinc *z* dipping into a beaker which contains dilute sulphuric acid (about 20 parts by volume of water to one of acid) constitutes a simple voltaic cell. The electro-motive force of such a cell is 1.05 volts. As soon as circuit is made, zinc replaces the hydrogen in the sulphuric acid, and hydrogen bubbles are evolved at the surface of the copper plate. This produces what is known as electrolytic polarization, and the current falls off. The great problem for the electrician is how to dispose of this hydrogen, and, broad-

ly speaking, the working efficiency of any cell depends upon the extent to which this is done.

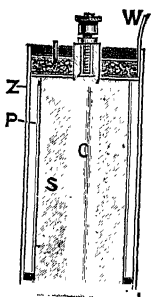
**Leclanché Cell.**—This is the cell most extensively used in bell circuits. It commonly consists of a glass vessel containing a saturated solution of sal-ammoniac (ammonium chloride) and a zinc rod *z* or hollow cylinder. A porous pot of unglazed porcelain *p* occupies the centre of the cell, and holds a carbon plate *c* tightly packed round with small lumps of crushed carbon and black oxide of manganese (manganese dioxide). Diffusing through the porous pot, the sal-ammoniac moistens the powdered carbon and manganese dioxide, and thus enables the current to pass.

**Dry Cells.**—A popular form consists of a cardboard cylinder containing a zinc cylinder *z* with wire *w* attached. This is lined with a paste *p* made of plaster of paris 27 parts, water 51 parts, and sal-ammoniac 12 parts. A carbon rod *c* is then put in the centre, and the remaining space *s* filled up with a mixture of sal-ammoniac, powdered carbon, manganese dioxide, zinc sulphate, and glycerine, made into a paste with water. On standing, the paste hardens into a firm, glue-like mass.

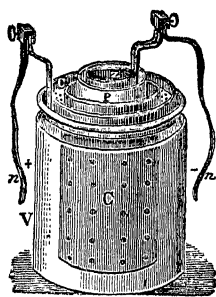
**Daniell's Cell.**—The essential parts of the Daniell cell are a zinc rod immersed in dilute sulphuric acid, or zinc sulphate solution, and separated by a porous pot of unglazed earthenware from a copper plate dipping into a solution of copper sulphate. The copper-sulphate solution must be kept saturated. This

zinc is formed. When the cell is in action, the sulphuric acid attacks the zinc, forming zinc sulphate and liberating hydrogen. The molecules of hydrogen traverse the pores of the porous pot and continue into the outer cell, where the hydrogen combines with the copper sulphate, forming sulphuric acid, and depositing pure copper on the copper pole. The hydrogen thus never reaches the copper plate. The chemical reaction consists essentially in the replace of copper by zinc in the solution. If zinc sulphate is used instead of sulphuric acid, the resistance is considerably higher, but the action is similar.

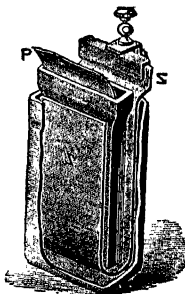
**Grove's Cell.**—Sir William Grove devised a cell which has both a higher voltage (as much as 1.9 volts) and a lower internal resistance than the Daniell. It differs from the Daniell in having platinum foil immersed in concentrated nitric acid instead of copper in copper sulphate. The hydrogen liberated by the solution of the zinc in the sulphuric acid passing through the depolarizing nitric acid towards the platinum, decomposes the nitric acid, and is itself oxidized, forming water and nitrogen peroxide gas. This gas appears in the form of red fumes in the inner pot; but it causes no polarization, for being very soluble in nitric acid, it does not attach itself to the platinum, nor does it set up a counter E.M.F.



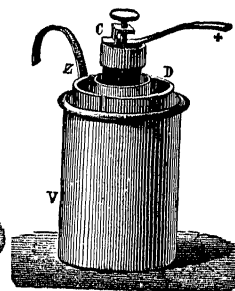
*Dry Cell.*



*Daniell's Cell.*



*Grove's Cell.*



*Bunsen's Cell.*

is effected by having in the solution a supply of copper-sulphate crystals, which, as the solution becomes weaker, gradually dissolve in the liquid and restore its strength. If the cell is not required for immediate use, water may be placed in the porous pot, and the cell short-circuited, until sufficient sulphate of

**Bunsen's Cell.**—This is merely a modification of the Grove Cell in a cheaper form, the expensive platinum plate being superseded by a rod of carbon. The internal resistance and the voltage are practically the same as in the Grove's cell; and the chemical action is also similar, the evolved hydrogen decomposing the nitric acid and uniting with part of its oxygen to form water, dark-red nitrogen peroxide fumes being given off.

For arrangements of batteries, see OHM'S

LAW, ELECTRICITY, CURRENT, ACCUMULATOR. See H. S. Carhart's *Primary Batteries* (1891); W. R. Cooper's *Primary Batteries* (1901); Silvanus Thompson's *Elementary Lessons in Magnetism and Electricity* (1900); Poyser's *Magnetism and Electricity* (1892); Jamieson's *Elementary Manual of Magnetism and Electricity* (4th ed. 1897).

**Cellini, Benvenuto** (1500-71), the greatest of the Italian artificers in gold during the renaissance; born in Florence. He settled in Rome under papal patronage, and made numberless works of art, from elaborate silver vases for cardinals, and statuettes, to coinage dies for Clement VII.; while, for the same pope, he defended the castle of San Angelo against the besieging Bourbon troops (1527). Later he spent some time (1540-5) in Paris. The colossal bronze relief, *The Nymph of Fontainebleau*, is now in the Louvre. His one large bronze statue of Perseus, in Florence, is technically a triumph, though, artistically, the bronze portrait of Bindo Altoviti, so much admired by Michael Angelo, is finer. For translation of his *Autobiography*, see *Life of Benvenuto Cellini* by J. A. Symonds.

**'Cello**, contraction of violoncello. See **Violin**.

**Cells**. As to the part the different classes of cells play in the structure and functions of the animal body, and theories involved, see **BIOLOGY**.

**Cellulitis** is inflammation of the loose cellular connective tissue of the body, either starting in the cellular tissue itself, or spreading to it from other tissues. It may be acute or chronic, circumscribed or diffuse. Cellulitis must be distinguished from erysipelas, which is caused by a specific organism. Preventive treatment consists of the antiseptics of every wound or abrasion, however small, and particularly when any poison may be present, as in a sting or bite.

**Celluloid**, or **Xylonite**, consists essentially of a solid solution of the lower nitrates of cellulose in camphor. The cellulose, in the form of bleached cotton or tissue paper, is immersed in a mixture of certain proportion of nitric and sulphuric acids to form nitrocellulose or pyroxylin. After nitration is complete (30 minutes or more), the product is washed to remove the acid. The next step in the process is *bleaching*. To accomplish this, the cellulose is reduced to a pulp and treated with a solution of potassium permanganate acidified by the addition of sulphuric acid. After a variable period (3 to 12 hours), the

bleaching liquid is run off from the vats, and the pulp is washed and then treated with sulphur dioxide (gaseous) to precipitate the remaining potassium permanganate, again washed to remove every trace of acid, and again hydro-extracted. The bleached nitrocellulose is now thoroughly dried, usually in a drying press, after which it is ready to be made into celluloid. In America the cakes from the drying press are ground and mixed in special mills with pulverized camphor, the moisture is expressed by hydraulic pressure, and the resulting product is rolled in a rolling mill, at a temperature of about 65° C. The nitrocellulose is thus dissolved in the melted camphor, and celluloid is produced. Cutting, drying, dressing, and polishing complete the process. Crude celluloid is a nearly colorless substance, transparent to translucent. It can be cemented to wood, leather, and other substances by collodion or a solution of shellac and camphor in alcohol. Celluloid finds a wide range of application in manufacturing industries. It is used for combs, toys, and toilet articles; in the manufacture of lacquers; for dental appliances and optical instruments; in machinery for emery discs, packing rings, tubes, valves, etc.; and for printing blocks and stamps.

**Cellulose** is the chief component of all vegetable tissues, in which it exists in elongated cells or fibres. In composition it is a carbohydrate ( $C_6H_{10}O_5$ )<sup>n</sup>, with the same empirical formula as starch and dextrin, from both of which, however, it differs materially in its properties. Cotton-wool and filter-paper are almost pure cellulose, from which it may be seen that it is a white, opaque solid, odorless and tasteless, appearing under the microscope to consist of thin, flattened tubes. It is insoluble in water, but is soluble in a concentrated solution of zinc chloride, a property which finds application in the manufacture of vulcanized fibre; in an ammoniacal solution of cuprous oxide, from which it may be re-precipitated by neutralization with an acid; and in alkaline thiocarbonates, forming a solution known as viscose, extensively used in the manufacture of artificial silk. When treated with strong solutions of caustic soda, cellulose swells and contracts, the hollow fibres being transformed into solid filaments, a phenomenon which is made use of in the process of 'mercerizing.' The first step in making rayon, modern smokeless powder, cellophane, or similar product is to dissolve the cellulose into liquid form. One of the chemicals used in doing this is nitric acid, and this

forms nitro-cellulose. This product treated with camphor makes a plastic material which is molded and dyed into toys, combs, eyeglass frames, and a long list of other products, and is called by various trade names. Non-shatterable safety glass is made by inserting a sheet of this substance between two sheets of glass and pressing them together. The nitro-cellulose process was first discovered by Count Chardonnet in 1884; and in 1889 fabrics made from cellulose were shown by him. The cellulose acetates, made by another process (acetyl cellulose), are also of commercial importance, being extensively used in the manufacture of non-inflammable celluloid substitutes, as 'cellite', and artificial silk (the so-called 'acetate silk'). Besides the applications of its derivatives, cellulose is employed in enormous quantities in the fibrous state in the form of cotton, linen, jute, hemp, etc., to make textiles, and in the state of pulp, obtained chiefly from wood and esparto, to make paper. Consult Cross and Bevan's *Cellulose*; Schwalbe's *Chemie der Cellulose*; Worden's *Technology of the Cellulose Esters* (10 vols.); Martin's *Industrial and Manufacturing Chemistry* (5th ed., 1920).

Textile technologists have long been deeply interested in the problem of how plants manufacture their cellulose. Without this information they could only estimate the molecular weight (which they placed at about 163), and furthermore they could neither determine the exact melting point nor the molecular architecture of the pure substance. Experiments conducted in 1935 by Mrs. Wanda K. Farr of the U. S. Department of Agriculture and Miss Sophia H. Eckerson have revealed this important cellulose structure. The particles, hitherto thought too small to see, turned out to be football-shaped bodies .00006 inches long. These particles formed compact strands and were laid down, string after string, on the cell wall. In so doing they merged so neatly with a gelatinous cement substance that the structure looked completely homogeneous unless the cement were dissolved. Mrs. Farr and Miss Eckerson succeeded in their experiments because they treated their cotton fibre with strong hydrochloric acid. Since this double structure of cellulose has been revealed, organic chemists are able to study the two components separately and will soon be able to fill in the cellulose unknowns.

**Celman, Miguel Juarez.** See **Juarez-Celman, Miguel.**

**Celosia**, a popular garden annual belong-

ing to the order Amarantaceæ. There are two main types of celosia, the crested and the plummy. *C. cristate*, popularly known as Cockscomb, is the best known example of the crested type. It grows to a height of nine or more inches and bears beautiful red, violet, crimson, or yellow flowers.

**Celsius, Anders** (1701-44), Swedish astronomer and mathematician. He wrote important works on astronomy, but is remembered chiefly as the inventor of the centigrade thermometer (see THERMOMETER).

**Celsius, Olof von** (1716-94), Swedish historian and poet. His historical works are especially noteworthy for the thoroughness of their criticism and the brilliancy of their style. The best known are *Konung Gustaf I.'s Historia* (2 vols., 1746-53) and *Konung Erik XIV.'s Historia* (1795).

**Celsus**, an Epicurean philosopher who flourished in the second century. He is credited with the authorship of an attack on Christianity called *Logos Althes* ('True Discourse').

**Celsus, Aulus or Aurelius Cornelius**, a Latin writer on medicine. His work, in eight books, contains a discussion of the history of medicine; remarks on diet and the general principles of therapeutics, with the consideration of the treatment of the various diseases; an account of surgery, which shows that many of the most serious operations were practised; and finally a pharmacopœia containing many excellent prescriptions. There are editions by Ritter (1840) and Daremberg (1859) and an English translation with *Life* by A. Lee (1831-6).

**Celt**, a now discarded term for the stone and bronze axes and chisels of prehistoric times.

**Celtiberi**, a people of ancient Spain, descended from Celts who at an early period invaded the Spanish peninsula and intermarried with the Iberians, the primitive inhabitants of the country.

**Celts, or Kelts**, a name applied in early history to the peoples who lived in the west and north of Europe, regardless of precise limits or origin. At the height of their power they extended from the north of Scotland to the southern shores of Spain and Portugal, and from the northern coasts of Germany as far south as Rome. The Atlantic bounded their territory on the west, the Black Sea on the east. The Celtic peoples, in so far as they can be identified by the uncertain test of languages, are represented in modern Europe (1) by the Gaelic-speaking communities of some

parts of Ireland, the Scottish Highlands and Islands, and the Isle of Man, and (2) by the Cymric-speaking inhabitants of Wales and Brittany. Belonging to this second division, although without such a strong title from the linguistic point of view, are those Cornish people whose near ancestors used a Cymric form of speech. Further, there is presumably a large proportion of Celtic blood in the mixed race forming the population of England, notably to the north of the Trent and throughout the western counties, and in the non-Gaelic-speaking peoples of parts of Scotland and Ireland. Except for the Bretons, none of the continental peoples has retained a Celtic language. The Celts are described as tall, pale, and fair-haired, their dress consisting of a sleeved blouse, sometimes belted, with trousers fitting close to the ankle—the Highland 'trews' of the 18th century. The British Celts encountered by the Romans in the 1st century B.C. were conspicuous by their tartan clothing, usually red or crimson. They knew how to work such metals as iron, bronze, gold, and tin, and adorned themselves with collars of gold, bracelets, finger-rings, and necklaces of glass beads. The Celts of Gaul and Belgium wore plated armor of bronze and iron, and at other times chain-mail coats; and they, as well as their British kindred, ornamented their armor with enamel. The British Celts were stockbreeders and agriculturists, and from their wheat they produced 'meth-e-glin' or honey-beer. So highly advanced were they as seamen that Cæsar, beginning his invasion of Britain, found the combined navy of the Britons and the Bretons much superior to his own. Generally, however, the civilization of the island Celts lagged behind that of their continental brethren, due to the fact that they were colonists. While the Celts of Gaul had well-built cities, their island kindred were living in hamlets and hill forts. It is clear that they practised 'head-hunting,' and preserved the skulls of their enemies as trophies. Their religion, Druidism, involved human sacrifice. See DRUIDS.

Celtic belongs to the Indo-European group of languages, and in its forms and inflections, so far as they are known directly or can be reconstructed, early Celtic closely resembled Latin and Greek. Its personal names, like the Greek and Teutonic personal names, are all compound terms, usually of two elements, of which one part qualified the other—Orget-oria, 'king of slayers'; Cinget-oria, 'king of heroes'; Catu-maros, 'great in battle.' No early Celtic literature has been preserved,

though there must have been much bardic poetry and many historical tales among the early Celts. The Druids did not commit their learning to writing, and the Bards may have followed their example. Yet by Cæsar's time writing was in vogue among the Gauls, who had come under the influence of Massilian culture. The Helvetii, when they went on their great migration, kept accurate muster rolls in Greek characters. After the Roman conquest, the Gauls of France took readily to learning (as also to agriculture), and even hired professors at the public expense. Cisalpine Gaul supplied some of the greatest Latin writers: Virgil, Catullus, and Livy bear Celtic names, and were probably Gauls. Seneca is also Celtic. The Celts of Britain, after the introduction of Christianity, showed the same desire for learning, and Ireland from the 8th century was renowned for its scholars.

See BRETON LANGUAGE AND LITERATURE; GAELIC LANGUAGE AND LITERATURE; WALES: *Language and Literature*.

Consult Rhys' *Celtic Britain*; Rhys and Jones' *Welsh People*; Nicholson's *Keltic Researches*; Rolleston's *Myths and Legends of the Celtic Race* (1911); Shane's *The Celt and the World* (1917).

**Cement**, any material, whether natural or manufactured, which causes adhesion between two surfaces, or serves as a matrix to combine particles into a whole. Cements may be divided for consideration into three classes: (1) Building Cements, or calcareous cements, which include common lime, hydraulic limes, cement proper (all the hydraulic cements), the gypsum plasters (of which plaster-of-paris is the foundation), and oxychloride cement; (2) Bituminous Cements, made with asphalt, tar, and pitch; (3) Adhesives and Lutes, including a wide variety of mixtures, ranging from ordinary glue and rubber cement to putty and pipe-joint cements. The use of some plastic substance to bind together the stones or other materials used in building is exceedingly ancient. During the Middle Ages little advance was made in the knowledge of building cements, common lime being used almost exclusively. The modern cement industry dates from the last half of the 18th century. The modern Roman cement was developed during the early years of the 19th century. Artificial hydraulic cement was first manufactured in France in 1813, and in England in 1822. About 1825 Portland cement was invented. Lime mortar, which has been used since ancient times in laying up brick and stone masonry, is made from a

slaked lime paste and sand. The disadvantages of lime mortar are that the absorption of carbon dioxide goes on very slowly; it cannot proceed at all under water; and the hardened product is of very low strength. Its advantages are its cheapness and its ease of preparation and of use. Beside its use in building, lime mortar is sometimes used as wall-plaster, for which purpose hair is mixed therein (2 or 3 lbs. per ton of plaster) to give the plaster coat cohesion.

Hydraulic Cement is a burned and finely ground mixture of lime, clay, and sand, in such proportions that the product, when mixed with water, undergoes a slow hardening by the formation of complex chemical compounds differing from any of the original materials. The most perfect kind is Portland cement, formed by mixing selected materials so as to give a product of definite composition. Natural Cement is made from limestones which contain considerable impurity in the form of fine clayey matter. Rosendale, N. Y., has been the centre of this class of cements from 1823 to the present time. See CEMENT ROCK.

Portland Cement is made from many different kinds of material, as marl, limestone, clay, slag, etc. The mixture resulting is so carefully controlled that almost precisely the same results are produced in all cases. The ingredients of Portland cement typically limestone and clay, are ground together (either wet or dry, depending on whether the raw materials are obtained in dry state or not), and then burned.

The clinker which drops out of the kiln is allowed to cool by weathering or by the employing of some cooling device, and is then conveyed to grinders. Grinding is a most thorough process, as it is necessary to reduce the material to a powder as fine as flour; a finely ground cement will leave not more than 15 to 25 per cent. residue on a sieve of 200 meshes per lineal inch (40,000 per sq. in.). During the grinding process it is usual to add a small percentage of gypsum or plaster to improve the setting properties. The finished product is stored for a time to age, so that any free lime contained in it may become carbonated. The time in which a cement sets or becomes hard varies greatly, but it is possible to manipulate a cement by admixture with a small proportion of plaster-of-paris, so as to prolong considerably the interval between the period of gauging (or mixing with water) and the initial set. From 20 minutes up to 5 or 6 hours may represent the speed of setting

in different samples. Ten hours is the maximum time allowable under government specifications. In use, cement is mixed with 25 to 30 per cent. of water and one to three times its volume of sand, forming a mortar rather stiffer and less workable than lime mortar. This is used either as mortar, or, mixed with twice to three times its volume of broken stone or gravel, as concrete, the uses of which in engineering construction are manifold. See PORTLAND CEMENT; CONCRETE.

Gypsum Plasters rely for their setting properties upon the combination of the sulphate of lime, which is their chief ingredient, with a portion of the water of crystallization, which has been expelled by heat. They include plaster-of-paris, cement plaster, flooring plaster, and hard-finish plaster.

Bituminous Cements, which are prepared chiefly from the natural asphalt, were used in the earliest times for compacting sun-dried bricks, and in place of other mortars in laying up brick and stone masonry. Today, their chief uses are to form pavements, to cement together the elements of brick and stone pavements, to serve as roofing materials, to use in calking ships, and for waterproofing courses in foundations and along walls.

Adhesives and Lutes include such simple materials as fire-clay, used in cementing up the bricks of furnace linings; glazier's putty, which is whitening mixed with linseed oil; rubber cement; leather cement; glue, or animal gelatine; casein, albumen, and collodion also have cementing uses. Vegetable gums and oils are the cementing ingredients forming the base of nearly all paints, linseed oil being of chief importance because of its strong power of hardening by absorbing oxygen.

Consult Redgrave's *Calcareous Cements, their Nature and Uses*; Butler's *Portland Cement*; Dibdin's *Lime, Mortar, and Cement*; Standage's *Cements, Pastes, Glues, and Gums*; Cummings' *American Cements*; Blount's *Cement*; Eckels' *Cements, Limes, and Plasters* (2d ed., 1922).

**Cementation**, a process of converting (pure) wrought iron into steel by raising it to a white heat in contact with carbon. See STEEL.

**Cement Rock, Water Lime, or Hydraulic Limestone**, a variety of limestone containing siliceous clay as an impurity, making a mixture suitable for cement manufacture. This is the natural rock-cement as distinguished from Portland cement.

**Cement Stones**, a group of rocks belonging to the lowest Carboniferous of Scotland,



are a transition between the fresh-water deposits of the Old Red and the truly marine Carboniferous limestone.

**Cemetery**, a portion of land set apart for the burial of the dead. In early times burial was usually made in tombs; later, prominent ecclesiastics were buried in or beneath the churches; then, as space in the churches was limited, came the custom of burying the dead in the surrounding yards. As population increased, the necessity arose of establishing cemeteries away from the centres of activity. In America, the greater number of cemeteries are owned and managed by the smaller cities, but the largest and best managed are usually controlled by private corporations. Probably the most famous of modern cemeteries are the *Campo santo* in Pisa, Italy, and *Père Lachaise* in Paris, France. The American cemeteries of Mount Auburn, near Boston, and Greenwood, New York City, are conspicuous for their beauty of plan and careful maintenance. In the United States, there are more than 80 national cemeteries, containing the graves of more than 360,000 American sailors and soldiers. The best known is that in Arlington, Va. See BURIAL; BURIAL CUSTOMS.

**Cenci, Beatrice** (1577-99), a Roman lady of patrician birth. According to a story long accepted as true, her father, an old man, after conceiving an incestuous passion for his daughter, was put to death by an assassin employed by his wife, his son Giacomo, and Beatrice. The conspirators were subsequently executed by order of Pope Clement VIII. This legend is the subject of a powerful tragedy by Shelley. See an article in *Century Magazine*, January, 1908, by M. Crawford.

**Ceneda**, Italy. See **Vittorio**.

**Genis, Mont**, a peak of the Alps (6,831 ft.), close to the Franco-Italian frontier. One of the great historic Alpine passes, it has been known since the 4th century. It is now penetrated by the Mt. Genis Tunnel (8 m. long).

**Cenobites**. See **Cænobites**.

**Cenomanni**, or **Cenomani**, a Celtic people of the Aulerici nation of Gaul, who inhabited what is now the department of Sarthe.

**Cenotaph**, usually the tomb or monument of one deceased but not interred there, originally employed in cases where the bodies of persons could not be recovered, such as death in foreign wars or by drowning.

**Cenozoic**. See **Tertiary**.

**Censer**, a metal vessel used in the Eastern, the Roman Catholic, and, occasionally, the Anglican church for burning incense during divine service.

**Censor**, the title of the two magistrates in ancient Rome who were highest in dignity, if not in power, whose duty it was primarily to take the census of the people, a part of the solemn ceremony of purification performed every five years. The power of the censors depended upon the fact that with them lay absolutely the classification of the citizens in their centuries and tribes, so that the enfranchisement both of individuals and of classes rested with them. In connection with their supervision of morals, they had the right of affixing a stigma to the name of any man enrolled in their lists—a much-dreaded disgrace. A law enacted in 265 B.C. provided that no one should be elected censor a second time. The office disappeared with the republic.

**Censorate, Military**, a government department organized in time of war for the purpose of insuring secrecy and protection. The duty of the censorate is to see that no information which might be of any assistance to the enemy is transmitted by means of letters, telegrams, or press articles.

**Censorship of the Drama**. Before the Reformation in England ecclesiastical ordinances regulated the stage, but in the reign of Elizabeth the state assumed control, and several acts were passed to prohibit plays objectionable to the government. All political allusions were forbidden, but in other directions the greatest license was allowed. The gathering forces of Puritanism consequently regarded the stage as an unclean thing, and when the English civil wars began (1624) the theatres were immediately closed. With the Restoration came the inevitable reaction. Fielding's plays, *Pasquin* (1736) and the *Historical Register* (1737), in which he freely travestied the political transactions of the day, and a scurrilous piece called *The Golden Rump*, attacking the ruling powers, led to an act (1737) which gave legal sanction to the customary censorship by the Lord Chamberlain. In 1909 an investigating committee, appointed in response to a petition from 40 authors for the abolition of the censorship, reported a compromise which gives practical independence of the censor, where that is desired, under conditions of production similar to those in the United States.

In France the state censorship of plays ceased in 1906. The only restraint upon a theatrical performance at present is exercised by the police authorities, who may, if they think a play dangerous to public morals, prosecute the manager of the theatre. In Denmark there is a censor of plays appointed

by the Ministry of Justice, and in *Holland* the control of theatrical performances is vested in the burgomaster of each town. In *Italy* the permission of the prefect of the province in which it is to be performed must be obtained for the production of any opera or stage play.

In the *United States* the supervision of dramatic productions falls to the local police or the mayor or other officials issuing the licenses for theatres and dramatic productions. A law which permits public immorality to be suppressed if shown by any overt act seems to cover the ground to general satisfaction. The creation of the office of censor, therefore, seems unlikely, as long as the censorial powers now vested in public opinion continue to be exercised with a fair balance of good judgment.

**Censorship of the Press**, the official supervision of the publication of books, pamphlets, newspapers, and periodicals, with a view to preventing the printing and circulation of matter subversive of law or morals. In the *United States* there has never been a true censorship of the press, although there are laws against libel and the publication of scandalous matter. In its origin the theory of censorship of the press is that of protection of the weak against pernicious or dangerous thought. In normal times this theory, while not abandoned, is usually held in abeyance but in times of revolution, warfare, or other disturbances, it comes to the front and is vigorously enforced. During the *World War* a strict censorship was exercised in all countries, giving rise, as is inevitably the case, to a vast amount of criticism. The press practically everywhere acquiesced in the censorship although not in all cases approving it. See also *PRESS, FREEDOM OF THE, and MOVING PICTURES*.

**Census**, an enumeration of the people in a country or district. The word is a Latin one, originally applied to the functions which the Roman censors performed, of periodically enumerating the people. The first country of large area to provide for a periodical enumeration of its population was the *United States*, where the first census was taken in 1790. French and German censuses are now taken at 5-year periods; while the *United States*, *Canada*, *Great Britain* and her colonies, *Italy*, *Russia*, *Austria*, *Belgium*, *Norway*, and *India* have a decennial census. When census taking first became a government function, it was hardly more than an enumeration of population. Even at the present time, popular in-

terest is confined largely to a consideration of the growth and distribution of population and to the sociological significance of these returns; while the results of inquiries of more recent addition, such as those relating to manufacturing, agriculture, mining, etc., are of less general interest, appealing rather to special groups of the population.

It has been estimated by S. N. D. North, former Director of the U. S. Census, that at least 700 millions of people are periodically enumerated, that 300 millions have been enumerated once or twice at irregular periods, and that the remaining 900 millions of the population of the globe have never been counted. The population of the world, based on latest estimates was in 1941 put at about 2,150,000,000. distributed approximately as follows.

Asia .....	1,100,000,000
Europe .....	540,000,000
North America .....	180,000,000
South America .....	90,000,000
Africa .....	166,000,000
Australia and Oceania .....	74,000,000
Total .....	2,150,000,000

In the *United States* provision was made for the first census and a decennial census thereafter in the Constitution. In 1790 a single schedule, containing two or three inquiries with reference to color, sex, and age of each person enumerated, was used. The number and extent of the inquiries were steadily increased until the censuses of 1880 and 1890, when the schedules used, particularly those relating to manufactures, became so complicated and so overloaded with inquiries that it was found advisable in subsequent censuses to narrow somewhat the scope of inquiries and simplify the schedules to a considerable extent.

In 1902 a permanent Census Bureau under the Department of the Interior was organized. It is now possible, owing to the organization of the permanent bureau, to confine the regular decennial census to a more limited field of investigation, making possible greater accuracy of enumeration than heretofore. The census comprises four principal groups of subjects: population; agriculture, including irrigation and drainage; manufactures; and mines and quarries. The territory covered includes each State of the *United States*, the *District of Columbia*, *Alaska*, *Ha-*

waii, Porto Rico, Guam, Samoa, and the Panama Canal Zone. The enumeration of the population is taken as of Jan. 1. It is usually provided that the decennial census period shall occupy three years, and that the reports shall be completed and published within that period. The enormous task of counting a population of about 150,000,000 included within the United States and its dependencies demands a high degree of organization. The law provides for the appointment of an adequate number, usually between 400 and 500, of supervisors who have immediate charge of the enumerators in the several fields assigned to them, the supervisors being in turn directly responsible to the Director of the Census. The total number of enumerators required to take the census of 1940 was about 100,000. Schedules for use in securing the desired information are prepared under the supervision of the Director of the Census and issued to the various enumerators. The returns, before being tabulated, are carefully inspected for omissions, errors, and inconsistencies. The tabulation is then done by the use of punch cards, the facts ascertained regarding each person, farm, or establishment being recorded by punching holes in these cards. Card-punching machines are used for this work. The cards for each locality are counted by means of machinery so devised as to register electrical contacts made through the punched holes, and the tabulated facts for each unit area are automatically recorded, thus avoiding errors which might result from recording the results by hand, and also expediting the work of tabulation.

The returns thus tabulated are analyzed, and the reports prepared by qualified statisticians and economists. The results of the census are published in the shape of bulletins, and subsequently appear in permanent form in large quarto volumes. Aerial maps were used in conducting the 1945 farm census.

Consult *The History and Growth of the U. S. Census* (U. S. Bureau of Publications, 1900); *The Story of the Census, 1790 to 1916* (U. S. Census Bureau, 1916).

**Census, U. S. Bureau of**, a bureau of the Department of Commerce, was created in 1902 as a branch of the Department of the Interior, was transferred to the Department of Commerce and Labor in 1903, and since 1913 has been a bureau of the Department of Commerce. Its primary function is the conduct of the comprehensive Federal decennial census of population, agriculture, manufacturing, and mines and quarries (see **CENSUS**),

but it also conducts numerous other inquiries, notably decennial censuses of wealth, debt, and taxation, of religious bodies, of water transportation, of fisheries, and of dependent, defective, and delinquent classes. It publishes quarterly data as to stocks of leaf tobacco held by manufacturers and dealers; issues periodical statistics of cotton production, consumption, and supply; collects current data (monthly or quarterly) relating to the production, supply, and sales of basic or key commodities, and publishes monthly a 'survey of current business.' The divisions of the Bureau and their chief functions are as follows: *Administrative Division*: General supervision of personnel; handling of general



Photo from A. T. De La Mare Co., Inc.  
A Cluster of Centaureas, including Cornflower and Sweet Sultan.

correspondence. *Population Divisions*: Collection of statistics relating to population (including occupations). *Division of Manufactures*: Collection of statistics pertaining to manufactures and to electrical industries, to mines, quarries, and oil and gas wells. *Divi-*

*sion of Vital Statistics:* Collection of statistics of births and deaths. *Division of Statistics of Cities:* Collection of financial and general statistics of cities having more than 30,000 inhabitants. *Division of Agriculture:* Collection of statistics relating to agriculture. *Division of Cotton and Tobacco Statistics:* Collection of current statistics relating to cotton and quantities of leaf tobacco held by manufacturers. *Geographer's Division:* Maintenance of records as to boundaries of supervisors' and enumerators' districts and creation of new districts where needed. *Statistical Atlas of the United States:* Preparation of maps, charts, and diagrams illustrating statistics in census publications.

**Cent**, a contraction of the Latin *centum*, 'a hundred,' and of the Latin *centesimus*, 'a hundredth part.' A *cent*, in the United States, is the hundredth part of a dollar. In 1785 Congress adopted a resolution that the money unit of the United States be one dollar, and the smallest coin a copper one, of which there should be 200 in each dollar. Between 1785 and 1890, coins of one-half, one-, two-, and three-cent values were authorized at various times. But after 1890 all cent pieces but the one and five were discontinued. *Cent* is also used for the following coins: *Centavo*, the hundredth part of the Chilean peso, also of the Mexican peso or dollar. *Centena*, the hundredth part of the Bolivian dollar. *Centesimo*, the hundredth part of the Italian lira. *Centime*, the hundredth part of the franc in France, Belgium, Switzerland, etc. *Centimo*, the hundredth part of the Spanish real, the old unit of value in Spain. In Holland it is the hundredth part of the Dutch guilder.

**Centaurea**, a genus of annual and perennial plants of the order Compositæ. Among cultivated species is the Cornflower or Blue-bottle (*C. cyanus*), familiar to European cornfields, and popularly known in the United States as Bachelors' Button. The annual or biennial Sweet Sultan (*C. moschata*), with purple, white, or yellow flower heads and pleasant scent, is also an old garden favorite. See illustration.

**Centaur** ('bull-killers'), a wild race of men who in early times are said to have inhabited the forests and mountains of Thessaly, and whose chief occupation was bull-hunting. Earlier accounts represent them as huge savage men, but later legends picture them as monsters in which a human head and trunk were joined to the body and legs of a horse.

The Centaurs were celebrated in Greek

mythology for their struggles with Hercules. The most famous of their number was Chiron, the teacher of Achilles and other heroes. He was a wise and just man, but most of the Centaurs were cruel and lustful. Consult Lawson's *Modern Greek Folklore and Ancient Greek Religion*.

**Centaurus**, a southern constellation mentioned by Aratus, and probably representative of the Centaur Chiron. It is situated between Argo and Scorpio, and is traversed by the Milky Way. The chief star,  $\alpha$  Centauri, is a splendid binary, revolving in 79 years, at a mean distance twenty-four times that of the earth from the sun. It is our nearest stellar neighbor, the intervening space being crossed by light in  $4\frac{1}{3}$  years. Its measurement in 1833 yielded to Henderson the first authentic result for the parallax of a star. The  $\alpha$  Centauri system gained additional interest when, in 1917, it was discovered that a certain star of the eleventh magnitude was moving very nearly in the same direction and at the same speed as  $\alpha$  Centauri. Being very near and at the same time of small apparent brightness, it must be very faint intrinsically. No other star is known to be as faint. The star has been fittingly named 'Proxima Centauri.'

Alpha and  $\beta$  Centauri, a white star of the first magnitude, are designated the 'Southern Pointers,' because they guide the eye to the Cross. Nova Centauri rose abruptly to seventh magnitude in July, 1895, and was noted by Mrs. Fleming on the Arequipa plates.

**Centaur** (*Erythræa*), a genus of annual plants of the family Gentianaceæ. They have showy pink or red flowers which are said to possess medicinal value. The Common Centaur has been esteemed in medicine since the days of Dioscorides and Galen; and although no longer in the Pharmacopœia, its flower tops are still sometimes gathered and dried by country people in England and on the Continent. The allied *Sabbatia angularis*, known as Bitter Bloom or Rose Pink, enjoys similar repute in the United States and Canada.

**Centenary** (Lat. *centum*), a period of a hundred years, usually employed to signify the commemoration of an event, as the birth (sometimes the death) of a great man.

**Centennial Exhibition, International**, an international exposition of the industrial and fine arts, in celebration of the one hundredth anniversary of American independence, held at Philadelphia from May 10 to Nov. 10, 1876. Fairmont Park was selected as the site; and here a space of 236 acres was set apart

for the purpose, on which more than 200 buildings were erected.

Besides the individual States, about 50 foreign countries sent exhibits. The total number of admissions was 9,910,966, including 8,004,000 paid admissions. On Pennsylvania Day (Sept. 28) 274,919 persons passed through the gates. The Centennial Exhibition was not only the first great international exposition held in the United States, but it was one of the largest held anywhere. By many it is regarded as typifying the emergence of this country from its traditional isolation, and as a great concrete illustration of the nation's commercial and industrial importance. It played an important part in unifying the different sections of the country by bringing together their diverse products, and thus making them familiar with the industrial characteristics of one another. See EXHIBITIONS. A history of the Centennial Exhibition was issued in nine volumes in 1880 by the U. S. Department of State.

**Centennial State**, a popular name for Colorado, because it was admitted into the Union in the centennial year, 1876.

**Centerboard**, shifting or drop keel used in small boats and racing craft, especially yachts and cat-boats. Its object is to prevent a boat making leeway by offering great lateral resistance to the water. Folding centerboards are also used for small boats and canoes.

**Centering**, the framework upon which an arch or vault of stone, brick, or iron is supported during its construction. The simplest form of centering is that used by masons and bricklayers for the arches of common windows and doors. This is merely a deal board of the required shape, upon the curved edge of which the bricks or stones of the arch are supported until they are keyed in. In building bridges or other structures, where arches of great span are to be constructed, the centering is usually made of framed timbers, or timbers and iron combined. The arrangement of the timbers should be such that the strain upon each shall be mainly a thrust in the direction of its length, for if the strain were transverse, a comparatively slight force would snap it, and if a longitudinal pull, the whole structure would be no stronger than the joints holding the pieces of timber together. Occasionally, when a very great span is required, and the navigation will permit, piers are built on the bed of the river, or piles are driven into it, to support the centering directly, simplifying it, and at the same time

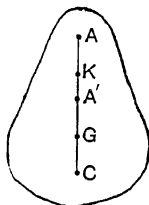
facilitating a more rigid disposition than in centering supported only from the sides. Cupolas, like those of the Pantheon and St. Peter's at Rome, St. Paul's in London, or the flat domes of the Turkish mosques, require very effective centerings. See CARPENTRY.

**Center of Gravity**, also known as the center of mass or center of inertia, is that point in a body through which the weight of the body acts, and is such that if it is fixed the body will balance about it in any position. The conception is a simple one in the case of a body of invariable shape, but it may be extended by suitable definition to the case of any system of bodies under any conditions of mutual freedom or constraint. The center of gravity of a body, or combination of bodies, has certain important dynamical properties. If a body be struck by a blow in a direction through the center of gravity, the body will move away without rotation; but if the direction of the blow is not through the center of gravity, the body will move off with combined translation and rotation.

In a strictly scientific sense, the term center of gravity should be applied to that point (if it exist) towards which the gravitation attraction of the body on other bodies acts. Thus, two uniform spheres attract one another as if each were condensed in its center. Their centers are, therefore, real centers of gravity. But cubes will not attract one another through definite fixed points within them. The cube of uniform material has not a true center of mass. For the latter is obtained by a definite process of averaging which leads always to a definite result, whatever the distribution of matter. In the case of bodies of finite size near the earth's surface, the particles composing the body are acted on by parallel forces due to the earth's attraction; and the process of finding the center of mass is identical with the process of finding the resultant of these parallel forces. Hence such bodies are really acted on by a single force passing through the center of mass, which is also a center of gravity. Indeed, when a true center of gravity does exist, it is coincident with the center of mass; but although all distributions of matter have a center of mass, comparatively few have a real center of gravity.

**Center of Oscillation**.—Let a body with centers of mass *C*, oscillate through small angles about a horizontal axis through any chosen point *A*. If *A* be taken very close to *C*, the rate of oscillation will be slow, because

of the small leverage  $AG$ ; and if  $A$  be taken very far away, again the rate of oscillation will be slow. There will evidently be some particular position for  $A$ —say  $K$ —which will give the most rapid oscillation. For every position of  $A$  further removed from  $G$  than this critical position  $K$  there will be a second position  $A'$ , nearer to  $G$ , for which  $GA \cdot GA' = GK^2$ , and about which the body will oscillate



Centre of Oscillation.

in the same period. Not only so, but if we take  $c$  in  $AC$  produced such that  $CC = GA$ , and set the body oscillating about an axis through  $C$ , exactly the same period of oscillation is obtained. This corresponding point  $c$ , situated in  $AC$  produced, is called the center of oscillation relatively to  $A$ . If  $C$  is made the center of suspension,  $A$  becomes the center of oscillation. It can be shown that the body will oscillate in the same time as simple pendulum of length  $AC$ .

**Center of Percussion.** If a body be free to rotate about a given axis, and if it be struck in such a way that the blow does not produce pressure on the axis, then the direction of the blow passes through a point in the plane containing the axis and the center of mass, which is known as the center of percussion. This explains the fact that if some object be struck by a stick held in the hand a jar will be felt, unless the blow be made at the center of percussion of the stick with regard to the hand. The center of percussion with respect to any axis is the same point as the center of oscillation.

**Centigrade.** See **Thermometer**.

**Centimetre**, a unite of length, the one-hundredth part of the metre, and equal to 0.3937 of an inch. It is much used for scientific purposes. See **METRIC SYSTEM**; **C.G.S.**

**Centipedes** (*Chilopoda*), a division of the Myriopoda, airbreathing arthropods, which in many points resemble insects, but have no wings, and have numerous legs. Centipedes may have more or many less than a hundred legs. They are carnivorous, poisonous, with flat bodies, many-jointed feelers, toothed cut-

ting mandibles, and two pairs of maxillæ. The poisonous action is due to the two poison claws, which are placed in the head region, and, in the case of tropical specimens, are capable of inflicting a severe and perhaps fatal bite. Centipedes are darkness-loving animals, nocturnal in their food hunting, lurking under stones or among rotten wood and the like during the day. Moving actively about at nights, feeling their way by means of their antennæ, they light upon insects, worms, and other small animals, which they seize and kill with their poison-bearing appendages. Some forms can run with some rapidity, and wriggle about in curious serpent-like fashion. See **MYRIOPODA**.

**Centlivre, Susannah** (1667-1723), English actress and dramatist. She wrote 19 plays, of which the best known are *Love at a Venture*, *The Gamester*, *The Busybody*, *The Wonder*, and *A Bold Stroke for a Wife*. Some of them still hold the stage, being interesting in plot and lively in dialogue.

**Centner** is, with metallurgists, a weight of 100 lbs. The German centner is 50 kilograms or 110¼ lbs. *avoirdupois*; the metric centner is 100 kilograms.

**Cento** (Lat. 'a patchwork garment'), a composition, generally poetical, composed of lines and phrases extracted from other works, and combined so as to convey a different meaning from the original. Thomas Watson's *Hecatompathia* (1582) contains a sonnet, (No. 89), composed of 'sentences' from classical writers literally translated.

**Cento**, tn. and epis. see, Italy; birthplace (1591) of the painter Il Guercino, who founded here an academy of painting.

**Central America**, that portion of the American continent which lies between Mexico and South America and includes the states of Guatemala, Salvador, Honduras, Nicaragua, Costa Rica, and Panama, and the colony of British Honduras. The Sierra Madre of Chiapas extends across Guatemala, the northernmost state, and attains a height of nearly 10,000 ft., and mountains continue southward into Nicaragua. Volcanic rocks are widely distributed, especially in Nicaragua, Northern Costa Rica, and near the Pacific coast, where they form a cordillera, and rise to considerable heights, such as Acateango in Guatemala (12,800 ft.), and Irazu (11,200 ft.) in Costa Rica. As the line of greatest elevation lies much nearer the Pacific coast than the Atlantic, the rivers on the former slope are short. Largest of all is the Usumacinta, which rises in the western part of Guatemala.

forms part of the boundary between that republic and Mexico, and traverses the Mexican States of Chiapas and Tabasco.

In the low coast lands, the mean yearly temperature is from 80° to 73° F.; between 2,000 and 5,000 ft. above sea-level, from 73° to 63°; and above the latter frosts occur. The rainfall is particularly heavy on the Atlantic slope. In British Honduras over 71 in. fall in the year, and in Alta Verapaz, Guatemala, about 180 in. while San Salvador has only 54 inches. Still more striking is the contrast between Greytown (244 in.) and Rivas (69 in.) The flora is that of tropical America. The woods contain mahogany and cedar, logwood, Brazil wood, and other dyeing materials; bombax, cocoa palms, and mangroves; fibres, winter's bark, sarsaparilla, vanilla, india-rubber; orchids and other beautiful flowers. The fauna is as varied as the flora, and includes the puma, jaguar, tapir, manatee, monkeys, vultures, and birds of gorgeous plumage. Of the birds, two hundred and sixty species are peculiar to Central America. Insects are numerous and troublesome.

The most important aborigines in Central America were the Maya Indians whose influence extended into the present country of Mexico. The chief site of the Maya civilization, which was perhaps almost as advanced as that of the Incas of Peru was the peninsula of Yucatan. At the opening of the 16th century the Maya organization had disintegrated, the language had become a group of related dialects, while scattered over the region inhabited by the Mayas were the ruins of towns which had been the ancient centers of their culture. During the 16th century emigration from Spain to Central America began, and after the establishment of the independence of Central America, Europeans from other states than Spain settled there, while to certain sections colored people from the West Indies emigrated. The blood of these different peoples has mingled in a varying degree. The aboriginal element is probably the strongest in Guatemala. All the republics of Central America, with the exception of Salvador, face both the Atlantic and the Pacific Oceans, the Atlantic side being especially bound to the United States by its transportation, trade, and financial interests. The United States is the chief buyer of Central American products and the principal source of supply of its imports, and American financial interests predominate in all the countries except British Honduras, where British capital is employed in the lumber industry, and in

Guatemala, where German capital controls the coffee industry. Except where foreign enterprise and capital have developed the countries, they are very backward, though they have great latent possibilities as a source of supply of tropical fruits and tropical woods.

Central America was discovered by Columbus on his fourth voyage in 1502, was completely under Spanish control by 1524-5, and, with the exception of a region upon the Gulf of Belize of which the British secured control and which they still retain under the name of British Honduras, it remained in Spain's possession until 1821. In the latter part of that year, the five provinces of Guatemala, Nicaragua, Honduras, Costa Rica, and Salvador declared their intention to reject Spanish rule and to associate themselves with independent Mexico, and in 1824 a constituent assembly promulgated a constitution for the United Provinces of Central America, modelled upon the constitution of the United States. After a turbulent history of 15 years, this confederation was dissolved, and the five sections of Central America framed distinct constitutions. In 1903 Panama declared its independence of Colombia and made the sixth of the present republics. In 1907, at the instance of the Presidents of the United States and Mexico, a conference of the Central American states was held at which various agreements were drawn up concerning the mutual relations between these states. Among these agreements was a treaty which provided for the adjudication of their disputes by a Central American court of justice.

For a more detailed description of the various republics, see the separate articles on GUATEMALA; SALVADOR; HONDURAS; NICARAGUA; COSTA RICA; PANAMA.

*Bibliography.*—Consult Cramer's *Our Neighbor, Nicaragua* (1929); Halle's *Transcaribbean* (1936); Jones's *Guatemala, Past and Present* (1940); Herring's *Good Neighbors* (1941); Wilson's *Challenge and Opportunity: Central America* (1941).

**Central Asia**, that portion of Asiatic Russia lying to the s.w. of Siberia and comprising Russian Turkestan, Transcaspia, and the Kirghiz Steppe territory. It includes the provinces of Akmolinsk, Fergana, Samarkand, Semipalatinsky, Semirychensk, Syr Daria, Turgai, Transcaspia, and Uralsk and covers a total area, exclusive of the Caspian Sea and the Sea of Aral, of 1,325,500 sq. m. On the w. it is bounded by the Caspian Sea and European Russia, on the e. and s.e. by mountain ranges which separate it from Eastern

Turkestan and Mongolia, and on the s. by Afghanistan and Persia. The greater part of this area lies within the Aral-Caspian basin, while highlands in the e. and s. divide the country almost equally with lowlands in the w. and n. The latter fall in the neighborhood of the Caspian Sea below sea level, but a large proportion of the former rise to over 5,000 ft. while some reach an altitude of more than 20,000 ft. Much of the country in the mountains, as well as in the plains is of the steppe character, but sparsely clothed with vegetation.

The climate shows a remarkable uniformity for so large an area. The average summer temperature ranges between  $68^{\circ}$  and  $77^{\circ}$  F., and the winter temperature from  $50^{\circ}$  to  $23^{\circ}$  F. The population is composed, linguistically, of various races of the Turki stock, of Persians and other Iranians, of Galcha mountaineers, and of Russian Slavs (immigrants of recent date). Theoretically the native peoples are Mohammedans, but great religious laxity prevails. The earliest relations of Russia with Central Asia were with the khanate of Khiva. At the beginning of the 17th century the Tsar Michael Feodorovitch held communications with the khan relative to Cossack raids in Khivan territory, and in 1717 Peter the Great despatched a disastrous expedition to Khiva in a futile attempt to secure the submission of the khan as a vassal of Russia. At about the same time Russian dominion was successfully extended up the middle Irtysh by an expedition which founded Omsk, and in 1718 built the first fortress at Semipalatinsk destined soon to become an important center of trade with China and Central Asia. In 1842 a treaty of friendship and alliance was concluded with the khan of Khiva, and in 1844 the last of the Kirghiz Tartars submitted peacefully to Russian rule. Russian invasions were continued until, in 1865, Turkestan was constituted a frontier district with Tashkend as its capital.

In 1868 Samarkand was incorporated with Turkestan. Russian conquests in Central Asia continued until 1895 when the treaty was signed by which all the Pamir n. of the branch of the Oxus flowing from Sari-kul, or Lake Victoria, and a line drawn thence eastward to the Chinese frontier passed into the hands of Russia. See *BOKHARA*; *KHIVA*; *TRANS-CASPIAN RAILWAY*; *TURKESTAN, RUSSIAN*. Consult Lord Curzon's *Russia in Central Asia*; H. Stumm's *Russia in Central Asia* (Eng. trans.); G. F. Wright's *Asiatic*

*Russia* (2 vols); S. Graham's *Through Russian Central Asia* (1916).

**Central Forces.** A force acting on a given body is said to be central when it always acts toward a fixed point or center. The importance of this group of dynamical problems arises from the fact, established by Kepler and Newton, that the bodies constituting our solar system move under the influence of gravitational forces which pass very nearly through a definite point—the centre for the planets being approximately the centre of the sun, and the centre for each group of satellites being approximately the centre of the corresponding planet. It is found that calculations based on the assumption that the forces acting on the planets are toward one centre lead to results closely concordant with observation. Another simple example of an approximately central force is the case of a heavy body attached to one extremity of a string and set in rapid revolution round the other extremity, which is kept fixed. If we leave out of account for the moment the action of the body's own weight, we may regard it as acted upon by the tension of the string directed towards the fixed end. When a force acts upon a body, it causes acceleration, involving both change of speed and change of direction of motion; and in the case of a central force this acceleration must take place towards the centre. Hence there is no acceleration at right angles to the line joining the centre of force and the position occupied for the moment by the body. This condition leads, by simple dynamical considerations, to the statement of what is known as Kepler's law of equable description of areas. If we measure the area passed over by the line joining the centre of force and the body as the latter describes its path, we find that in all positions this area has the same value during the same interval of time. This law of planetary motion, established by Kepler after laborious calculations, led at once, according to Newton's principles of dynamics, to the conclusion that each planet was acted upon by a central force directed towards the sun's centre. The reason why the forces dominating the motions of the planets and satellites of our solar system may be treated as central forces is that the mass of the sun is very great compared with the combined mass of the planets, and that each planet is much more massive than its attendant moons.

**Central India** is the official name applied to a group of feudatory or native states occupying that part of India n. of the Central



Provinces, w. of Bengal, and s. of Rajputana and the United Provinces; p. 8,628,781.

**Centralization**, a term used in practical politics, as well as in political science, to indicate the tendency towards concentration of administrative power in the hands of the state or central authority, which tendency has steadily become more noteworthy as the conception of the function of the state has widened. In the United States the term is also applied to the tendency to concentrate legislative power in the Federal Government with the consequent weakening of the position of the states. This tendency is especially apparent in matters relating to commerce. In the last half century central control of local administration has been introduced in many states. Thus the control of the educational system, originally purely a local matter, has in many states been vested in a state board. State control of the administration of charities is another indication of the same tendency. Further, the administrative functions which have developed recently, as the administration of labor laws, of laws regulating state commerce, etc., have naturally been retained by the state. At present there is a widespread movement in favor of central supervision of local accounts. The movement in favor of municipal home rule, on the other hand, is part of a tendency towards decentralization of legislation.

**Central Powers**, a term applied to Germany and her allies in the World War, because of the central location of Germany in Europe.

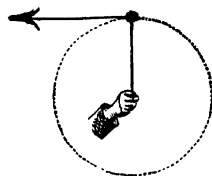
**Central Provinces**, lying in the center of the peninsula of India, are encircled on three sides by states under native rule. Their n. and n.e. limits are bordered by the large feudatories under the Central Indian Political Agency, and the s.w. by Berar and the dominions of the Nizam of Haiderabad. On the s.e., the n. districts of the Madras Presidency separate the Central Provinces from the Bay of Bengal. The Chota Nagpur division of Bengal touches the n.e. angle. Area 86,459 sq. m. The principal rivers are the Narbada, the Tapti, the Wardha, and the Waingunga. The s. extremity of the country is covered with wild, impenetrable jungle. A prolific soil yields a rich harvest—cotton, tilly-seed, wheat, rice, grain, pulse, and linseed being the chief products in the Nagpur division. The native states, of which Bastar is the largest, contain an area of 29,435 sq. m. and a p. of 1,996,383. The bulk of the population is Hindu; there is a large number of

Gonds (aborigines), and a fair percentage of Mohammedans. Successive seasons of drought and famine have greatly retarded the development of the country; p. 9,876,646.

**Central University of Kentucky**. A Presbyterian institution of learning at Danville, Ky., founded as Centre College in 1819. It comprises Centre College as its classical, scientific, and literary department, the Kentucky Theological Seminary at Louisville, the Hospital College of Medicine at Louisville, and the Louisville College of Dentistry.

**Centre, Canal du**, canal, France, joining the Saône and Loire. It begins at Châlons-sur-Saône, and extends to Digoin, on the Loire, a distance of 75 m.

**Centrifugal Force**, a term in dynamics somewhat misleading in its etymological meaning (L. *centrum*, 'the centre'; *fugere*, 'to flee'), but of great importance in its proper significance. To compel a body to move in a curve, a force must be applied at right angles to the directions in which the body is moving. The sharper the curvature of the path in which the body is to move, the greater must be the force required; and the more



*Centrifugal Force.*

rapid the motion of the body, the greater must be the deflecting force to make the body move in a path of given curvature. A stone whirled round at the end of a string is pulled in constantly by the tension of the string. Now, according to Newton's third law of motion, which is simply a concise expression of experience, to every action there is an equal and opposite reaction. The taut string pulls upon the fixed end in the direction of the stone: in this case the reaction is particularly evident, and it is the recognition of the reaction which has suggested the idea of a center-flying force. No doubt, before the foundations of dynamics were securely laid by Newton, the idea that a stone whirling round in a sling had an outward tendency was universally prevalent. As a matter of fact, the stone leaves the sling in the direction in which it was moving at the instant it got free. What we now understand by the

term centrifugal force is the reaction to the force which is required to make the moving body describe a curved path. This is sometimes called the centripetal force (*L. centrum*, 'the centre'; and *petere* 'to seek'). Its measure is the same as that of the force required to cause this curvilinear motion—*viz.* the product of the square of the speed into the curvature of the path. The principle of centrifugal force is used in many forms of mechanism, such as governors on steam-engines, rotary drying machines, cream separators, and centrifugal machines of various kinds. In drying machines, the wet material is placed in a rotating cylinder with perforated sides, through which the liquid escapes in virtue of centrifugal force. The action of the cream separator depends upon the fact that the cream is lighter, bulk for bulk, than the milk. Hence, for a given rate of rotation in a closed cylinder, the centrifugal tendency of the cream will be less. It will tend to accumulate in the centre, while the denser skim milk will be driven out to the sides.

**Centripetal Force.** See **Centrifugal Force.**

**Centumviri**, in ancient Rome a court of plebeian judges whose numbers varied from 100 to 180. Their jurisdiction originally extended to questions of status, quiritian ownership and succession, but latterly was confined largely to questions of succession. A spear, the special symbol of quiritian ownership, was erected in front of their court.

**Centurion**, a Roman officer of foot. The three principal divisions of the legion, each elected 20 centurions, of whom two were appointed to each of the 30 companies of foot into which the legion was divided.

**Century of Progress Exposition.** See **Exhibition.**

**Ceorl.** Originally the word meant a free-man who was not athegn or of noble birth. The ceorl occupied an intermediate position between the thegn and the serf, and tended to be absorbed into one or other of these classes, generally into the lower. By the time of the Norman Conquest the villein, takes his place in the records.

**Ceos**, now **Zea** or **Tzia**, an island in the Ægean Sea, one of the Cyclades, distinguished for its fertility and excellent climate.

**Cephalaspis**, one of the most remarkable of the many extraordinary fishes of the Old Red Sandstone. In Scotland several species have long been known from the sandstones of Arbroath. See Dean's *Fishes, Living and Fossil* (1895): Rav Lankester's *Monograph*

*of the Fishes of the Old Red Sandstone of Britain* (1868).

**Cephalhæmatoma**, a swelling caused by the effusion of blood under the pericranium of a newborn infant, due to pressure during birth. Usually it becomes absorbed, and therefore should not be interfered with unless supuration occurs.

**Cephalic Index.** See **Anthropology.**

**Cephalochorda**, a name applied to a class of vertebrates which includes only *Amphioxus*, the lancelet, and its near allies. See **AMPHIOXUS**.

**Cephalodynia**, a term applied to pains in the head, and in particular to those of a rheumatic nature.

**Cephalædium**, Italy. See **Cefalu.**

**Cephalonia**, **Kephalonia**, or **Kephalenia**, the Samos of the *Odyssey*, is the largest of the seven Ionian Isles lying to the w. of the mainland of Greece, opposite the entrance to the Gulf of Lepanto.

**Cephalopoda**, or **Cuttles**, the highest class of Mollusca, including those forms in which the foot has grown up around the head and is split up into arms. Except in the pearly nautilus and the female argonaut, the living forms are without shells, but many retain in the 'cuttle-bone' what is believed to be the last remnant of the shell. In the extinct *Ammonites* the shell was large, and, as in the living nautilus, divided into chambers by septa. Its reduction in living cuttles is probably associated with increased rapidity of locomotion, the living forms being actively predaceous, swift-swimming animals entirely confined to the sea. Many cuttles creep about on the sea-bottom by means of their sucker-bearing arms, but all are capable of jerking themselves swiftly backwards by means of the siphon or funnel. Except in *Nautilus*, there is an ink-bag, the contents of which the animals discharge into the surrounding water when alarmed, thus producing a cloud, under cover of which they may escape. The extinct forms, known as *Ammonites*, were very numerous in the Mesozoic era of geologic time, and were so nearly confined to it that their remains form the most characteristic fossil type of that era. *Ammonites* exhibit great variety of minor feature and size. Many are ornamented with ribs or knobs, and they are known to range from a fraction of an inch to 10 ft. in diameter. No more beautiful, interesting, and extensive series of fossil forms of any type of animals is known. See Zittel's *Paleontology* (1900), and other textbooks.

**Cepheus.** (1.) In Greek mythology, King of Ethiopia, husband of Cassiopeia, and father of Andromeda. (2.) An ancient Greek constellation, belonging to the legendary group connected with the fable of Andromeda.

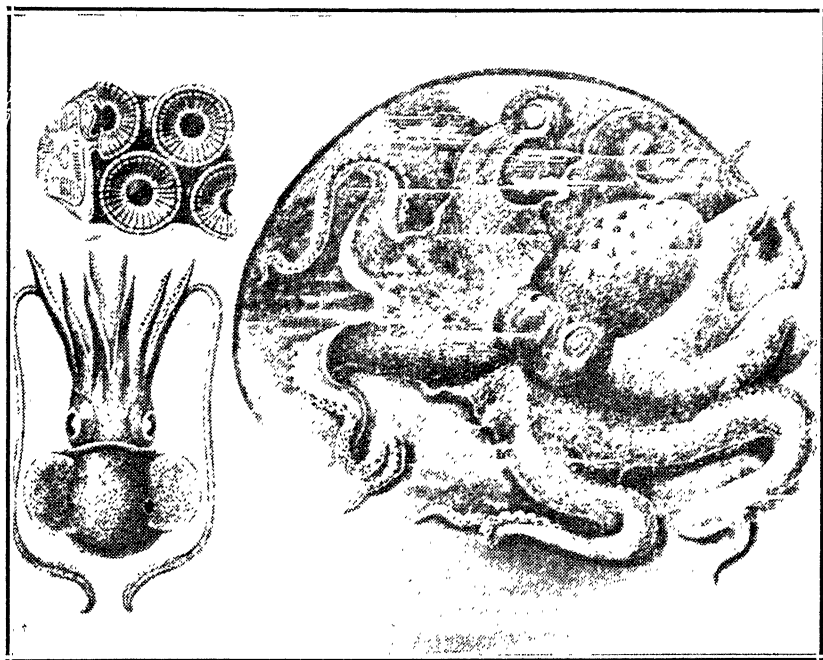
**Cephissus**, a river in ancient Greece, now called the Mavronero; also the largest river (modern name, Sarantaporos) in Attica.

**Cepit** ('He took'). Used in civil practice it is a form of replevin. In criminal practice

viper (*C. cornutus*) belongs. It occurs in N. E. Africa, extending into Palestine and Arabia. Another species (*C. vipera*) is believed to have been Cleopatra's 'asp.' Both are poisonous snakes, belonging to the family Viperidae.

**Cerasus**, a colony founded from Sinope, on the s. shore of the Black Sea. From this place the cherry, as well as its name, was introduced into Europe.

**Ceratodus**, a name applied to a genus of



*Cephalopods.*

Right, Octopus; Upper Left, Suckers. Lower Left, Cuttle.

it is a technical word employed in indictments for larceny.

**Ceram**, or **Sirang**, an isl. of the Dutch E. Indies, one of the Moluccas; lies between New Guinea and Celebes. It produces sago, cloves, coconuts, rice, cocoa, and timber; p. estimated at 70,000 to 100,000.

**Ceramics.** See **Pottery**.

**Cerargyrite**, horn silver, or silver chloride, AgCl, is a silver ore of considerable importance in certain mines. The largest masses are brought from Peru, Chili, and Mexico. Many silver mines of the United States produce this mineral.

**Cerastes**, the genus to which the horned

fishes which includes many fossil forms, and one (or two) living species (mud-fish) from Queensland rivers. The *Ceratodus* uses both its gills and its lungs, or swim-bladder, as breathing organs. The latter is apparently functional chiefly during those periods of the year when the water becomes foul, owing to decaying vegetable matter, or is laden with sand. The animal may reach a length of six feet.

**Ceraunii**, the Ceraunian Mountains. See **ACROCERAUNIAN**.

**Cerberus**, the hound that guarded the entrance to Hades. He is usually represented with three heads, but sometimes with 50 or

even a hundred. The story of how Hercules mastered him and brought him up to earth is told by Homer, Hesiod, and Virgil.

**Cercaria**, a stage in the life-history of the liver-fluke (*Distomum*). The cercaria is really the young fluke. It is furnished with a tail, by means of which it wriggles out of the body of its host, the water-snail, swims through the water, and becomes encysted on a blade of grass, losing the tail in the process. If eaten by a sheep, it becomes an adult liver-fluke. See LIVER-FLUKE.

**Cercyon**, son of Poseidon, and King of Eleusis; a cruel tyrant, who murdered all strangers by wrestling with them, until Theseus defeated him and slew him.

**Cerdic** (d. 534?), King of the West Saxons, the ancestor of all Eng. kings except Canute, Hardicanute, the two Harolds, and William the Conqueror. He founded one of the greater Teutonic kingdoms in Britain, is said to have been ninth in descent from Woden, and to have landed probably in Hampshire (495). He conquered the Isle of Wight in 530. See *Chronicle, Anglo-Saxon*.

**Cereals** include all grasses producing mealy seeds used for food. The term denotes the entire plant and also the grain by itself. The word cereals is derived from *cerealia*, meaning the offerings, consisting largely of wheat and barley, which were made to the Roman goddess Ceres. The principal cereal crops of the world, including corn, wheat, oats, barley, rye, and rice, have always and everywhere been cultivated to a much larger extent than other classes of crops, and have also been the most important source of food for man and the domestic animals. Their culture antedates the history of civilization. Corn is a native of America. The aborigines of North and South America cultivated it before the discovery by Columbus, and it is only since then that the plant has been introduced into other parts of the world. The culture of wheat is very old, dating back in China to 2700 B.C. The plant is related to rye, barley, the cultivated rye grasses, and couch grass. Oats have not been cultivated as long as wheat, and they were not known to the ancients. Barley was grown in ancient Egypt as a food for man and beast. In Europe it constituted the chief bread plant until the 16th century. Rye has not been grown as long as wheat and barley. It was unknown to the Egyptians and the Greeks. This crop furnishes the bread to a large portion of the peasant class of Europe. Rice is the principal food crop of Asia. It was grown in China

3,000 years before the Christian era and was introduced into Europe in the 15th century. The plant is a near relative of wild rice. The millets and the sorghums are also classed with the cereals. See F. L. Sargent's *Corn Plants, their Uses and Ways of Life*.

**Cerebellum**. See **Brain**.

**Cerebral Hæmorrhage** is caused by rupture of a blood vessel in the substance of the brain. See BRAIN; PARALYSIS.

**Cerebration**. See **Psychology**.

**Cerebritis**, inflammation of the brain, commonly coincident with meningitis.

**Cerebro-spinal Fluid**, lymph lying between the coverings of the brain and the spinal cord. The cerebro-spinal fluid has free passage all over the brain and spinal cord, between the membranes, and probably acts as a buffer, or water-bed, to guard the brain and cord from the effects of concussion. It consists mostly of water, is slightly saline, varies in quantity, is most abundant in old people, and is rapidly restored if drained off. It is over-abundant in the morbid condition known as *spina bifida*, where it forms a tumor.

**Cerebro-spinal Meningitis**. See **Menigitis**.

**Cerebrum**. See **Brain**.

**Ceres**. See **Demeter**.

**Ceres**, the first-known asteroid, was named after the tutelary goddess of Sicily by Giuseppe Piazzi, who discovered it on Jan. 1, 1801. The largest but not the brightest member of the group, its diameter measures 477 m. (Barnard), while its orbit has a mean radius of 257 million m., and is traversed in a period of 4.6 years.

**Cereus** is the genus of Cacti, including some of the largest members of the order; several of the species grow, indeed, to a great height. The best for cultivating are the pink-flowered *C. fibriatus*, about 20 ft. in height; and the scarlet *C. speciosus*, which grows to about six ft. high. This is the so-called torch thistle. Of the night-blooming varieties, the most notable are the climbing *C. grandiflorus* which produces its lovely white, brown, and yellow flowers through the summer months. These, which reach about eight inches in diameter, begin to open at about 8 o'clock in the evening, and begin to close about 2 or 3 o'clock in the morning. During the time that they are expanded the flowers give out a pleasant fragrance of great penetration. The giant *cereus* (*C. giganteus*) is a familiar object on the arid plains of the Southwest. It grows to a height of 60 ft., and

resembles a gigantic tuning-fork at times, although it usually has several thick, ribbed, upright branches. It is studded with blossoms in spring, and in June the vari-colored, fleshy fruits, filled with a multitude of tiny black seeds, are ripe. The plant is known as 'pitahaya,' and the fruits form a staple food of the various Indian tribes in the regions where they grow.

**Cerigo** (anc. *Cylhera*), isl., Greece, celebrated for the worship of Venus (Aphrodite), who was said to have risen out of the sea near this island; p. 15,000.

**Cerithium**, a genus of gasteropod mollusks.

**Cerium** (Ce, 140) is an element found in a few rare minerals—e.g. cerite, orthite, and the Samarskite of North Carolina. Its oxide is an important ingredient of incandescent gas mantles.

**Cermak, Anton** (1873-1933), Mayor of Chicago who was fatally wounded in February, 1933, when Joe Zangara fired into an automobile at Miami, Fla., carrying President-elect Franklin D. Roosevelt, in an attempted assassination. Cermak, riding on the running board, was one of several persons wounded. Born in Bohemia, Cermak emigrated to America in his youth, interested himself in politics, was elected to the Chicago City Council in 1912, and became Mayor in 1931.

**Cerro Gordo, Battle of**, a battle of the Mexican War, fought on April 18, 1847, at the pass of Cerro Gordo, on the road connecting Vera Cruz and Jalapa, between about 8,500 Americans under Gen. Winfield Scott and about 12,000 Mexicans under Gen. Santa Anna. The Mexicans were defeated and driven in great disorder from the field, the American plan of battle being determined by a reconnaissance made by Capt. Robert E. Lee.

**Cerro Largo**, dep. in Uruguay, S. America, covered with well-watered grassy downs, on which large herds of cattle are grazed.

**Certificate**, a writing which testifies that a certain thing has or has not, taken place. Properly authenticated, it gives notice from one court to another of anything done therein, and is a judicial act. Certificates by certain officers may be used in evidence at a trial.

**Certified Check**, a check that has been presented at the bank upon which it is drawn and officially declared to be 'good.' This is done in writing, generally on the face of the instrument under the signature of some one in authority. It simply means that the drawer of the check has at the time the amount of

the check on deposit in the bank. The effect of certification is to make the holder a new depositor to that amount, and the bank becomes liable to him.

**Certiorari**, a writ by which a superior court requires an inferior court to send to the former the record of some proceeding pending in the latter. It lies in most of the states of the United States and in England, where it is issued out of the High Court.

**Certosa di Pavia**, a Carthusian Monastery of Italy. The church has a profusely decorated façade (1473 onwards), one of the richest examples of Renaissance work in Italy.

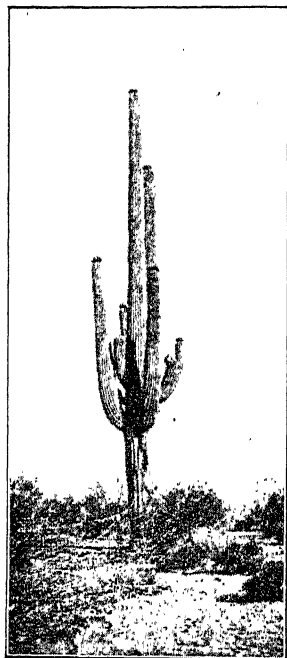
**Cerumen** (Lat. *cera*, 'wax'), the yellow waxy substance secreted by certain glands in the outer ear, in the passage leading to the drum or tympanum. Its function is to catch solid foreign particles.

**Cervantes-Saavedra, Miguel de** (1547-1616), Spanish novelist, poet, and dramatist. He was educated under the famous humanist, Juan Lopez de Hoyos; but on the coming of Cardinal Giulio Acquaviva to Madrid (1568), Cervantes was appointed to an office in the nuncio's household, and accompanied his master to Rome. Leaving this service (1570), for the next five years he lived the life of a soldier. In the naval battle of Lepanto (1571), he had his left hand permanently injured, gaining thus forever his glorious nickname of *el manco de Lepanto*. He continued fighting against the Turks until 1575, when he was captured at sea by pirates, and carried, with his brother Rodrigo, as a slave to Algiers. He remained in captivity for five years. His one solace in his slavery had been verse, and on his return to Madrid (1582) from the campaign for the conquest of Portugal he settled down to a career of letters. He was imprisoned twice on false charges. He spent the last ten years of his life in Madrid in a dire struggle with poverty. He died in 1616 and was buried in the church of the Trinitarian nuns in Calle Cantaranas, afterwards the Calle de Lope de Vega.

His best-known and his own favorite poetical work is the *Galatea*, a pastoral narrative tale, first published in 1585. Although the prose of Cervantes has overshadowed his poetry, of which he was so proud, there are verses of great beauty in the *Galatea*, and in *El Viage al Parnaso*. As a dramatist Cervantes worked hard, but not successfully, though he himself thought highly of his plays. *La Conquista* is perhaps the best. It is, however, as a novelist that Cervantes has become immortal. Successive writers have endeavored to dis-

cover in *Don Quixote* a great political satire; but the truth of Cervantes's own assurance is now generally admitted, that his sole desire was to write an amusing book to give the *coup de grâce* to the absurd books of chivalry imitating Amadis that had done so much to pervert Spanish character.

In 1613 Cervantes issued his twelve *Novelas Ejemplares* (Eng. trans. by MacColl, 1902, etc.)—short stories written at considerable intervals. They abound in wit and



*Cereus Giganteus.*

vivacity, rivalling even *Don Quixote* itself, and have maintained their popularity to the present day. Cervantes's last work was *Los Trabajos de Persiles y Sigismunda*, written in 1616, the dedication to the Count de Lemos being signed four days before the author's death (Apr. 23). The best bibliographical references in English to *Don Quixote* will be found in the introduction, by Mr. Fitzmaurice Kelly, to Mr. Ormsby's translation of the work (1901). The best Spanish biography of Cervantes is that by Fernandez de Navarrete (1819). A scholarly edition of *Don Quixote* in Spanish was published in London by Mr. J. Fitzmaurice Kelly (1892); and the

biography (1892) by the same English scholar is also excellent.

**Cervera y Topete, Pasqual** (1833-1909), Spanish admiral, was born, of a wealthy family at Jerez, Spain. He was regularly promoted and received numerous decorations. At the outbreak of the Spanish-American War (1898) he sailed with secret orders to defend Spanish interests in Cuba in command of a squadron. On July 3 the Spanish fleet, compelled by public opinion in Spain, though against Cervera's better judgment, attempted an escape; but the ensuing naval action resulted in the surrender of Cervera as prisoner of war. He was treated on his arrival in the U. S. with great distinction, and on his return to Spain at the close of the war was honorably acquitted by a formal court-martial.

**Cervetri**, or **Cervetere**, vil., Italy, occupies a corner inside the walls of the ancient Etruscan city of Cære, and is famous for its Etruscan graves, many of them hewn in the solid rock.

**Cervidæ**, the deer family; one of the families included in the Pecora, or true ruminants. The family Cervidæ is divided into two sub-families, the one including only the aberrant musk-deer (*Moschus*), the other the true deer, widely distributed over the globe, but absent from Africa and Australia.

**Cervin, Mont.** See **Matterhorn**.

**Cesalpini.** See **Caesalpinus, Andreas**.

**Cesarevitch.** See **Tsar**.

**Cesari, Giuseppe** (1568-1640), called IL CAVALIERE D'ARPINO, enjoyed a great reputation as a painter at Rome; he was the rival of Carracci and Caravaggio. His best works are the death of Cicero, and a Roman battle scene.

**Cesarotti, Melchiore** (1730-1808), Italian writer, born at Padua. Of his original works the most important is the *Saggio sulla Filosofia delle Lingue* (1785), in which he advocates a free development of language. His great achievement is the translation (in blank verse) of Macpherson's *Ossian* (1763; complete ed. 1772), which aroused extraordinary interest in Italy, and exercised a great influence both there and in other countries, his introductory dissertation being translated into English and edited with notes by J. M'Arthur in 1806.

**Cesena** (anc. *Cæsena*), tn. and episc. see, Italy. The Popes Pius VI. (1717) and Pius VII. (1742) were born here. Its history is al-

luded to by Dante (*Inferno*, xxvii. 52); p. 42,509.

**Cesnola, Luigi Palma di, Count** (1832-1904), Italian-American archæologist. In 1860 he came to the U. S. and served with distinction on the Union side in the Civil War until 1863, when he was wounded and taken prisoner. In 1865 he was made a brevet brigadier-general, was naturalized, and appointed U. S. consul to Cyprus. He there spent 10 years in a series of interesting excavations at Curium, Larnaca, and Dali. His collection of statuary, pottery, jewelry, and other objects of art was bought by the Metropolitan Museum of Art in New York City in 1873, where it is known as the Cesnola Collection. The genuineness of many of the articles he had collected was disputed for a time (1879), but the general worth of the collection was finally admitted, after a lawsuit in which the matter was thoroughly investigated. He wrote *Cyprus, its Ancient Cities, Tombs, and Temples* (1878), a *Description of the Metropolitan Museum of Art* (1882), and an *Atlas of the Cesnola Collection* (1885), besides various pamphlets on art subjects.

**Cespedes, Pablo de** (1536-1608), Spanish painter, architect, and poet, born at Cordova. His principal picture is the *Last Supper*, in Cordova Cathedral.

**Céspedes y Borgas, Carlos Manuel de** (1819-74). Cuban patriot, was born at Bayamo, Cuba. He was connected with General Prim's attempt against the Spanish Government (1844), and returned to Bayamo, where he chiefly lived, engaged in the practice of the law and literary work until the Cuban insurrection of 1868, which he inaugurated with a manifesto. The following year a Cuban Congress met and Céspedes was elected President by acclamation. He was deposed from the presidency in 1873. The cause of his death has remained a mystery.

**Cessio Bonorum.** In civil law, a process whereby a debtor made an assignment for the benefit of his creditors. The debtor was then exempt from imprisonment.

**Cession** (Lat. *cessio*, 'surrender'), the formal transfer of territory from one state to another by the act of the state making the cession. Some deference is usually paid to the wishes of the inhabitants of the ceded territory, but it is not a recognized rule of international law that the transfer must be with the consent of the people. Cessions are made by way of sale, exchange, or gift, or are exacted by a conqueror as a condition of peace. The civil and political rights of the inhabi-

itants of the ceded territory are usually determined by the treaty of cession. In the case of earlier cessions of territory to the United States, it was usually stipulated by the ceding nation that the inhabitants of such territory should as soon as possible be admitted to all the rights and immunities of citizens of the United States, and that in the meantime they should be maintained and protected in their liberty, property, and in the religion which they professed. The Treaty of Paris, under which the Philippines and Porto Rico were ceded by Spain, merely stipulated that the civil rights and political status of the inhabitants of the ceded territory should be determined by the Congress of the U. S. In the absence of express stipulations, the inhabitants change their allegiance and acquire a share in all the rights of their new state. At the same time they carry with them all their local obligations, local rights, and property. The new state is liable for the local debts of the ceded territory and those secured upon special revenues. There are instances where the new state has charged itself with a part of the general debt. Most treaties of cession contain a clause dealing with the question of debts. See CONQUEST; also Hall's and Wheaton's *International Law*.

**Cestoda.** See Tapeworms.

**Cestracion**, a genus of sharks of a somewhat primitive type. The living species, known as Port Jackson sharks, are confined to the Pacific Ocean; none exceed five ft. in length.

**Cestui que Trust.** See Trusts.

**Cestum Veneris**, or **Venus's Girdle**, a beautiful marine organism belonging to the Ctenophora, remarkable for its elongated, ribbon-like form.

**Cestus.** (1.) Thongs of leather worn by Greek and Roman boxers on their hands; not like modern boxing-gloves, to soften their blows, but to make them more severe. They were often weighted with lead and iron. (2.) The magic girdle of Aphrodite (Venus), which caused its wearer to inspire love in all beholders. See *Iliad*, b. xiv.

**Cetacea**, an order of marine mammals, including whales, dolphins, porpoises, and their allies. From fish they differ in their warm blood, four-chambered heart, air-breathing habit and many other characters; but they are very perfectly adapted for life in water. Of the many peculiarities of the skeleton, we can only mention that the bones are spongy and filled with oil, the neck short and stiff, the posterior portion of the verte-

bral column very freely movable, the skull greatly modified in association with the shifting backwards and upwards of the nostrils, while clavicles are absent, and the fore limbs curiously modified. Though the stomach is complex, the animals are all carnivorous, the majority feeding on fish, cuttle-fish, crustaceans, or small marine organisms of various kinds. The cetaceans are very widely distributed—the majority in the sea, a few in the rivers of Asia and S. America. Their whole life is passed in the water, and they are absolutely helpless on land. In the sea the young are brought forth and reared, special structural adaptations making the process of lactation possible under water. In spite of this aquatic habit, whales are as purely air-breathers as the horse or the cow, and must of necessity rise periodically to the surface to breathe, an operation which is facilitated by the horizontally placed tail-flukes. The majority are gregarious, swimming in herds or schools; and the females exhibit great devotion to their young, of which only one is usually produced at a birth. For toothed whales see articles CACHALOT, DOLPHIN, PORPOISE, BOTTLE-HEAD or BOTTLE-NOSE, NARWHALE; for whalebone whales see under that heading, also RIGHT WHALE. Consult F. Beddard, *Book of Whales* (1900); F. Bullen, *Denizens of the Deep* (1904).

**Ceteosaurus** is the name given by Professor Owen to an extinct reptile of gigantic size, the remains of which have been found in the Oolitic strata of England. The head and neck were missing, but from the dimensions of the body it is inferred that the animal was not less than 36 ft. in length and 10 in height. It belongs to the Dinosaurs, and is a member of the family of Atlantosaurs, which includes some of the largest animals known to have inhabited the globe. See Hutchinson's *Extinct Monsters* (1892).

**Cetinje**. See **Cettinje**.

**Cetotolites**, the tympanic and petrosal parts of the ear-bone of whales, are among the hardest and most durable of all organic structures, and are especially adapted for preservation in the fossil condition.

**Cettinje**, cap. of the former state of Montenegro; p. 3,000.

**Cetus**, an ancient constellation to the south of Aries. Although covering an expanse of sky 50° by 20°, it includes no star as bright as the second magnitude. Mira, in the neck of the Whale, is the first known periodical star. The constellation is crowded with 'white' nebulae, the most conspicuous among

them being an elliptical formation discovered by Caroline Herschel in 1783, and resolved into a spiral in a photograph taken by Dr. Roberts, Dec. 25, 1899.

**Cetywayo**, or, more phonetically, **Ketshwyo** (c. 1836-84), son of the Zulu king Panda, whom he deposed in 1856. After defeating his brother Umbulazie, his succession was recognized by Natal, conditionally on his disbanding his formidable army and ceasing his sanguinary methods of government. In 1882 he was brought to Britain, where mistaken public sympathy procured his restoration to a part of his country (1883). Soon after he was attacked and defeated by Usibepu, one of his ancient enemies, and Cetywayo was compelled to seek shelter in the native reserve.

**Ceuta**, fort. seapt. belonging to Spain, but situated at the e. extremity of the Moroccan peninsula which juts out n. towards Gibraltar. It answers to the ancient Abyla, one of the mythical Pillars of Hercules. Ceuta consists of an old town on the tongue of the peninsula, and a new town climbing up the hills behind; p. 13,269, embracing Spaniards, Moors, Negroes, Jews, and other races.

**Cévennes**, (ancient *Cebenna*), a range of mountains in the s.e. of France, forming the southern and eastern borders of the central plateau. The Cévennes stretch in a general direction from n. to s.w. over a length of 330 m. The principal peak of the system is Mézenc (5,753 ft.). The Cévennes form the watershed between the rivers that flow into the Mediterranean and those that flow into the Atlantic. In the southern part there are big forests, especially the chestnut groves of Ardèche, and extensive grazing grounds. Consult R. L. Stevenson's *Travels with a Donkey in the Cévennes*; S. Baring-Gould's *A Book of the Cévennes*.

**Ceylon**, an island and British Crown colony in the Indian Ocean, at the southeastern extremity of India, with which it is closely connected by a chain of sand banks and reefs known as Adam's Bridge. A broad strip of lowland borders the coast, widening out in an undulating plain to the n.; and mountains cover about one-sixth of the island in the central south. The highest summits are Pedrotallagalla (8,296 ft.) and Adam's Peak (7,353 ft.). The longest river is the Mahavili Ganga. The *climate* of Ceylon, though tropical, is modified by the surrounding sea, and by monsoons, prevailing from June to September and from February to May. The average temperature at Colombo is 80° F., while that at Nuwara Eliya, at an elevation



of more than 6,000 ft. is but 58° F. The rainfall is less than 50 inches in the n.w. and s.e.; from 50 to 75 inches in the n.e.; from 75 to 100 inches in a 20-m. belt surrounding the mountain district; and from 100 to 200 inches in the highlands.

The soil is exceedingly fertile, and palms, tree ferns, orchids, flowering trees, and other tropical plants grow in profusion. Forests formerly covered much of the island, but destructive methods of cultivation have laid waste vast areas. Remaining forests produce ebony, satinwood, and other valuable cabinet woods. The native fauna includes the

related to the products of agriculture. The making of lace, furniture, jewelry, and brassware is carried on by the villagers in their homes. The chief articles of import are cotton manufactures, rice, coal and coke, spirits, sugar, and manures. The population of Ceylon is 5,306,871. The Sinhalese are found chiefly in the southern and central parts of the island. The Tamils, or Malabars, have sprung from early invaders of Ceylon who from time to time swept across from Southern Hindustan. The Moormen are met with in every province as enterprising traders. The Burghers are the naturalized descendants of



*Ceylon, tea pickers at work.*

bear, buffalo, elephant, jackal, leopard, bat, several species of deer and monkeys, the peacock, parrot, and numerous reptiles. The *mineral wealth* of Ceylon consists chiefly of plumbago and of precious stones. With the exception of opals, diamonds, emeralds, and turquoises, practically every variety of gem is found, the most important being rubies, sapphires, garnets, and moonstones. The famous pearl fisheries in the Gulf of Manaar have been much less productive since 1905.

Ceylon is essentially an agricultural country. Among the older products are rice, which is the staple food of the people, cocoanut and other palms, and cinnamon. Tea is the staple product today, and rubber growing is also of great importance. *Manufactures* are chiefly

early European settlers. There is, besides, a remarkable tribe of outcasts—the Veddahs—believed to be descended from the Yakkos, the aboriginal inhabitants of the country. Buddhism is the prevailing religion of the island. The principal towns are: Colombo, the capital 244,163; Galle, 39,073; Jaffna, 42,436; Kandy, 32,562.

A Crown colony, Ceylon is administered by a governor, aided by an executive council of nine members, and a legislative council of 49 members. The judicial system includes a supreme court, police courts, district courts, and courts of request. Local boards and village tribunals give a measure of self-government to the people. *Education* is provided for by vernacular schools, in which tuition is

free, and in English schools in which fees are charged. There are also a Royal College and a Government Training College, and technical and industrial schools. The authentic history of Ceylon begins in 543 B.C., with the invasion of the island by Wijayo, who subdued the Yakkos, and bestowed on the kingdom his patrimonial name of Sihala. Buddhism was established about 300 B.C., and then was begun the erection of the numerous Buddhistic shrines, temples and monasteries whose ruins are one of the most interesting features of Ceylon. In 237 B.C. occurred the first of a series of Malabar or Tamil invasions and usurpations that marked the history of the Sinhalese until the arrival of the Portuguese in 1505. The latter established their first colony at Colombo in 1517, and eventually gained control of the entire coast. They were driven from the island in 1658 by the Dutch, who, after over a century of possession, surrendered to the English in 1796. Ceylon was formally ceded to Great Britain in 1803, and in 1815, by a convention with the Kandyan chiefs, the entire sovereignty of the island passed into British hands. Consult Major Skinner's *Fifty Years in Ceylon*; S. M. Burrows' *Buried Cities of Ceylon*; *Twentieth Century Impressions of Ceylon* (ed. by A. Wright); G. E. Mitton's *The Lost Cities of Ceylon*; Codrington's *A Short History of Ceylon* (1926).

**Cézanne, Paul** (1839-1906), French artist, was born in Aix-en-Provence. He was graduated from the college at Aix, where he formed a close friendship with Emile Zola. He studied at the Académie Suisse, coming successively under the influence of Delacroix, Courbet, and Manet. He joined the Impressionists at their first exhibit in 1874, and again in 1877; but his pictures were ridiculed by the critics, and he gained little recognition during his lifetime. His work is characterized by strength and harmony of color, and by an attempt to express the depth and modelling that was absent from the work of the Impressionist school. His paintings include still life, landscapes, and portraits. Consult A. Follard, *Paul Cézanne*, trans. N. L. Brom (1927), R. Fry, *Cézanne* (1927).

**C. G. S., or Centimeter-Gram Second System**, the system used by all scientists, and in daily commercial use by most nations, except the United States, Great Britain, and Russia, for the measurement of physical quantities. Its unit of length is the *centimeter*, that of mass, the *gram*, and that of time, the *second*. The last is the mean solar second, and

the other two arose during the French Revolution. See METRIC SYSTEM; UNITS.

**Chabas, François Joseph** (1817-82), French Egyptologist. His works are elucidative chiefly of two important periods of ancient Egyptian history, the conquest of the country by the Hyksos; and the time of their expulsion; they include *Les pasteurs en Egypte* (1868); *Etudes sur l'antiquité historique d'après les sources Egyptiennes* (1874).

**Chabazite, or Chabasite**, a hydrous silicate belonging to the zeolite group. Its crystals are white or flesh red in color, and it is found in basaltic rocks principally in Nova Scotia.

**Chabot, Philippe de** (1480-1543), Count of Charny and Buzancois (known as L'AMIRAL DE BRION), French soldier, was appointed governor of Burgundy and admiral of France (1526). He was the patron of Jacques Cartier.

**Chabrias**, (?-357 B.C.), one of the leading military commanders at Athens in the 4th century B.C. Cornelius Nepos wrote his life, and Demosthenes a special eulogy of him.

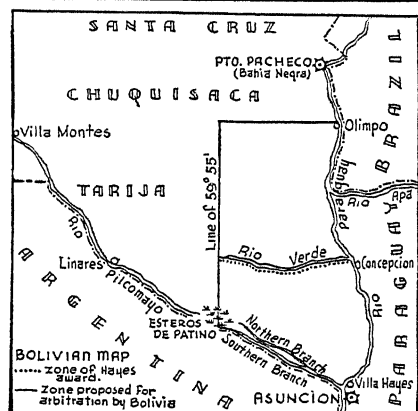
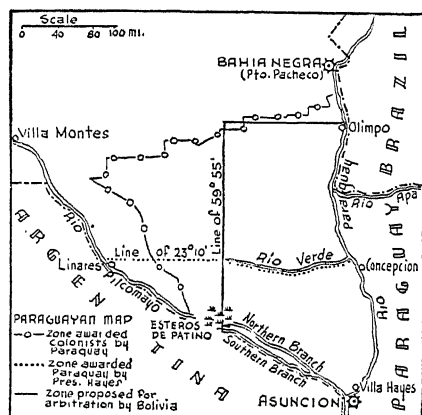
**Chabrier, Alexis Emmanuel** (1841-94), French musical composer, was born in Amberg. His first successful production was *L'étoile* (1877). *Le roi malgré lui* was produced at the Opéra Comique in Paris (1887) and he left an opera, *Briseis*, unfinished when he died.

**Chacma**, 'dog-headed, pig-like' monkey, a South African baboon, a near ally of the mandrill. It lives among rocks and enjoys a varied diet. It is frequently tamed, and occasionally taught to do serviceable things.

**Chaco, El**, territory, South America, consisting of part of the Gran Chaco, lying s. of the Bermejo River; area, 52,741 sq. m. Agriculture and cattle grazing are pursued to some extent, but timber felling is the most widely spread industry. The administrative center is Resistencia; p. 50,000.

**Chaco, El Gran**, area between Bolivia and Paraguay, South America. The century old dispute over the Gran Chaco came up anew in December, 1928, when Bolivia and Paraguay again came into conflict over the boundary line. Intervention by the League of Nations preserved the peace and furthered negotiations for arbitration, but the later fighting between the two countries resulted in heavy loss of life in 1932. Representatives of 19 nations in Washington joined in a note to the two governments, urging arbitration, and refusing to recognize any settlement of

the controversy by other than peaceful methods. Throughout 1932, the fighting continued, and in November, President Salamanca of Bolivia and his government was forced to resign. Despite efforts of the League of Nations and various other agencies, hostilities continued, and at the end of 1933, deaths from war and disease were estimated at 30,000; with 50,000 wounded.



Map of Chaco.

On June 12, 1935, under the aegis of a conference composed of representatives of Argentina, Chile, Brazil, Peru, Uruguay and the United States, an armistice was signed, and a treaty of peace was concluded on July 21, 1938. This was ratified the following month by both Paraguay and Bolivia. Under the terms of the treaty an arbitral award was to be made by the presidents of the six mediating countries within two months after ratification of the treaty. The award was

announced October 10, and on November 26, 1938. Bolivia and Paraguay resumed diplomatic relations.

**Chaconne**, a dance probably of Spanish origin, formerly popular, but now obsolete. It had slow and stately movements. The music for it was usually a series of variations on a ground bass of eight bars.

**Chad, St., or Ceadda** (d. 672), a native of Northumbria, was a disciple of St. Aidan, and became successively bishop of the East Saxons (664), of York (666), and of Mercia (669). His holiness and austerities were long proverbial in the n. of England.

**Chadbourne, Paul Ansel** (1823-83), American educator, was born in North Berwick, Maine. His works include *Instinct in Animals and Men* (1872); *Strength of Men and Stability of Nations* (1873-7).

**Chad, Lake, Tchad, or Tsad**, large lake. Africa, between Bornu on the w., Kanem on the n.e., and Bagirmi and Wadai on the s.e. and e. Its extreme length from n. to s. is said to be 120 to 150 m., while from e. to w. it has been variously estimated at from 60 to 130 m. Its waters are sweet, though the wells in the vicinity are salt. Lake Chad receives the waters of the Yobe or Yeou, but its chief feeder is the Shari. The lake abounds with fish, and is frequented by wild fowl, hippopotami, and alligators. The convention of 1898 gave France the right to its eastern shore. Consult Boyd Alexander's *From the Niger to the Nile* (1907).

**Chadwick, Sir Edwin** (1800-90), English social reformer. He was secretary of the Board of Health (1848-54), and helped form (1878) the Social Science Association. Consult *Life* by Richardson.

**Chadwick, French Ensor** (1844-1919), American naval officer, was born in Morgantown, W. Va. He rose to the rank of rear admiral (1903), retiring in 1906. During the Spanish-American War he commanded U. S. S. *New York*, was chief of staff to Admiral Sampson, and was advanced for conspicuous conduct in battle. Later he was president of the Naval War College (1900-3), and commander-in-chief of the South Atlantic squadron (1904). He was a member of the National Institute of Arts and Letters. His published works include *Temperament, Disease and Health* (1892); *The American Navy* (1915).

**Chadwick, George Whitefield** (1854-1931), American composer, was born in Lowell, Mass. He conducted all the leading symphony orchestras of America in his own

works, and organized a symphony orchestra in the New England Conservatory of Music. His compositions include overtures—*Rip Van Winkle*, *Thalia*, *Anniversary*, *Melpomene*, *Adonais*, and *Euterpe*; three symphonies; an opera—*Judith*; a lyric drama; three symphonic poems and many other works.

**Chadwick, James Read** (1844-1905), American surgeon, was born in Boston. He was founder, secretary (1876-82), and president (1897) of the American Gynecological Society and librarian of the Boston Medical Library (1875).

**Chadwick, John White** (1840-1904), American clergyman and author, was born in Marblehead, Mass. He was graduated from the Harvard Divinity School (1864), and was called to the Second Unitarian Church of Brooklyn, N. Y., with which he was associated for the remainder of his life. He was a contributor to *The Nation*, *The Christian Register*, and other periodicals. Many of his sermons were published, and his poems were widely known.

**Chærea, Caius Cassius**, a tribune of the prætorian guards of Rome under Caligula, who formed the conspiracy which ended that Emperor's life on Jan. 24, 41 A.D.

**Chæronca**, (now **Kaprena**), ancient Greek town in Boeotia, famous for the victory gained by Philip of Macedon in 338 B.C. over the Boeotian and Athenian forces. Here also Sulla defeated the generals of Mithridates in 86 B.C.

**Chætodon**, ('bristle teeth'), a genus of bony fishes, comprising some 70 species from the tropical parts of the Atlantic and Indo-Pacific, where they are especially abundant in the vicinity of coral reefs. The fish, which are carnivorous, are remarkable for the beauty and variety of their coloring.

**Chætognatha**, ('bristle jaws'), the name given to the class which includes the small transparent Arrow Worms. See also **SAGITTA**.

**Chætopoda**, (Greek 'bristle footed'), a class of worms including familiar types like the Earthworm, the fisherman's Lobworm or Lugworm, and the Sea-Mouse. They are often included under the title of Annelids or Ringed Worms. The class is divided into two main orders of Oligochæta and Polychæta, of which the latter is much the larger. See **EARTHWORM**; **LUGWORM**; **SEA-MOUSE**.

**Chætopterus**, (winged bristle worm'), a much-modified annelid, remarkable for its peculiar violet color and lateral fans or wings. It inhabits a parchment-like tube, and occurs in the Mediterranean.

**Chafer**, a common name for beetles or coleopterous insects, especially for those which are destructive of plants, particularly of the wood, bark, or roots of trees. The word is seldom used alone, but generally as part of a name with some prefix; as *cock chafer*, *rose chafer*, *bark chafer*, etc.

**Chaffee, Adna Romanza** (1842-1914), American soldier was born in Orwell, O., and entered the U. S. Army as a private in 1861. He was commissioned captain for gallant and meritorious service during the Civil War. In 1867 he became a captain in the regular army, and for the next 21 years was largely occupied in Indian warfare. He served in Cuba during the Spanish War as brigadier general and major general of volunteers, especially distinguishing himself at El Caney. In 1900 he was assigned to the command of the U. S. troops sent to the relief of the U. S. legation at Peking. He was promoted major general in the U. S. Army (1901); was in command of the division of the Philippines, and military governor (1901-2), and was commander of the Department of the East (1902-03). In 1904 he became lieutenant general and chief of staff. He retired in February, 1906.

**Chaffinch** (*Fringilla cælebs*), a species of finch, and probably that to which the name finch, now so extended in its signification, originally belonged. The whole length of the bird is about 6 inches. The chaffinch is found in almost all parts of Europe, in some parts of Asia, in the n. of Africa, and as far w. as the Azores. Because of its loud, clear, and thrilling voice it is much sought as a cage bird.

**Chafin, Eugene Wilder** (1852-1920), American temperance advocate, was born in East Troy, Wis. He was admitted to the bar of the Supreme Court of the United States in 1909. One of the leaders in the temperance cause in the United States, he was Prohibition candidate for President of the United States (1908, 1912) and for United States Senator from Arizona (1914). He is the author of *Washington as a Statesman* (1909), etc.

**Chagos Archipelago**, a group of low coral islands in the Indian Ocean, s. of the Maldives Islands; area, 76 sq. m. The largest is *Diego Garcia*, or *Grand Chagos*. The group belongs to Great Britain, and forms a dependency of Mauritius; p. 500.

**Chagres River**, a river of Panama, rises about 30 m. n.e. of the city of Panama, flows for 100 m. across the Isthmus, and enters the

Caribbean Sea at Chagres. The river flows through the Gatun dam, which constitutes a reservoir for receiving the floods of the Chagres and other rivers. See PANAMA CANAL.

**Chaillé-Long, Charles** (1842-1917), American soldier, explorer, and diplomat, was born in Princess Anne, Somerset co., Md. In 1874 he executed a treaty with the king of Uganda annexing that country to Egypt. He navigated the unknown Victoria Nile, discovered Lake Ibrahim, and solved the problem of the Nile sources. By order of Gordon he led an Egyptian expedition w. of the Nile, and was promoted colonel and bey. Returning to America, Chaillé-Long was graduated from the Columbia Law School in 1880. At the request of the U. S. Government assumed temporary direction of the U. S. consulate at Alexandria after the massacre of June 11, 1882. With the aid of a detachment of American sailors and marines, he saved hundreds of Christian lives, and the city itself from entire destruction, during the bombardment. In 1910 he was awarded the gold medal of the American Geographical Society for the final solution of the Nile source problem. He published *Central Africa: Naked Truths of Naked People* (1876); *My Life in Four Continents* (1912); and many other works.

**Chained Books.** In the 15th and 16th centuries books were of such high value that drastic means were necessary to secure them from theft. As a rule, they were arranged on long reading desks, and were chained to an iron rod running along the top of each desk. Chaining of books was discontinued in the early years of the 18th century. For a list of English churches with chained books, consult William Blades' *Books in Chains*; for further information, J. W. Clark's *The Care of Books*.

**Chain Mail, or Chain Armor**, a coat of armor much used in Europe in the 12th and 13th centuries, consisting of hammered iron links, connected together by rivetted links so that each link embraces four others, and worked into the form of a garment. See ARMOR.

**Chain Plates**, on board wooden ships, are iron plates bolted below the channels to serve as attachments for the dead-eyes, through which the standing rigging or shrouds and back-stays are rove and secured. In most of the modern iron-steel vessels *rigging screws* take the place of the older *dead-eyes*, the chain plates to which they are attached consisting simply of flat palms, having an eye

projection, rivetted to the inside of the *sheer* or top strake of shell plating.

**Chains**, series of rings or links of metal joined together so as to move more or less freely, and forming a strong but flexible band. The term is applied to a great number of forms, ranging from the finest ornamental chains of gold or silver, weighing but a few grains, to massive cables of wrought iron, each link of which weighs a hundred pounds or more. Chains are variously classified: according to use, as anchor chains, hoisting chains, surveyors' chains, etc.; according to material, as gold, silver, iron, or steel; according to the form of link, as open, stud, twisted, flat, and rolled link. The size is specified by the thickness of the bar metal from which the links are formed.

*Crane, hoisting, and anchor chains* are usually of wrought iron, which combines a high tensile strength with sufficient malleability to allow it to be bent or twisted into the desired form, and a high degree of ductility. Most wrought iron chains of more than one and one-quarter inches are hand forged and welded, but the use of the steam hammer has been introduced for chains above two and one-half inches. Smaller chains of inferior quality are made by machinery, the bar of metal being coiled into a spiral form and then cut into individual links. The breaking strain of any chain may be calculated from its cross section, to the area of which it bears a fixed proportion. Chains for suspension bridges differ from other chains in that the links are formed of flat plates of iron joined together by transverse pins. *Surveying chains* also have a peculiar construction (see SURVEYING).

Specially constructed chains designed to engage on suitably formed sprocket wheels are used extensively for *power transmission*. Power transmission chains are of two main types, non-silent and silent. Non-silent chains, in which the links are made up of a single roller or block held by side pieces and rivets, are used chiefly for mechanical drives as in motor cars, motor-cycles, and bicycles. Silent chains, sometimes known as flexible gearing, differ in having the links made up of several comparatively thin plates. They find a wide application in electrical machinery. (See GEARING.) Consult T. W. Trail's *Chain Cables and Chains*. For test requirements, consult Kent's *Mechanical Engineer's Pocket Book*.

**Chain Shot**, an obsolete artillery projectile,

consisting of two balls connected by a short chain.

**Chain Snake** (*Ophiobolus getulus*), a harmless snake of the United States, so called because of the chain-like markings on its skin.

**Chain Stores**, a system of retail selling which comprises a number of stores under a common ownership and management and having common policies and methods of operation. Chain stores existed in the days of the Roman Empire and possibly much earlier. It is claimed that the oldest chain now operating is that of the Hudson's Bay Company (1670). In the United States the chain store pioneer was George Hartford, who, in 1859, founded the Great Atlantic and Pacific Tea Company, the largest chain of retail stores in the world. Perhaps the most widely distributed in the world is that of the Singer Sewing Machine Company, founded in America, with associate companies in Great Britain, France and Germany. In India there are chains of railway buffets, bookstalls, hotels, general stores, and department stores operated by an English firm. Chain stores thrive in Japan, Denmark, Germany, Italy, Switzerland, Holland, Norway, Sweden, Egypt and elsewhere.

The chain store system includes almost every field of retail buying. Voluntary chains, which are really groups of independently-owned stores combined to combat the chain stores proper, are different from the systems considered above, as are also the chains of consumer-owned stores, managed by the co-operative societies in Europe. It is estimated that exclusive of chains of gasoline stations, bank, coal depots, farms and hotels, there are between 270,000 and 300,000 chain stores throughout the world, of which approximately 100,000 are chain grocery stores. In the United States the chain stores do an annual trade of about \$15,000,000,000 or about 30 per cent of total sales in all retail stores, which represents close to one-sixth of the total annual income.

The chief source of chain store superiority lies in greater merchandising efficiency with a curtailment of services. In principle, chain store operation depends on mass buying and mass selling. The introduction of the chain idea is perhaps the most important single factor of the 20th century in the distributing and marketing fields. Consult Baxter, *Chain Store Distribution and Management* (1931); D. Bloomfield, *Chain Stores* (1931); R. F. Daly, *Multiple Shop Accounts* (1933); Lebar, *Chain Store—Boon or Bane?* (1932);

Nichols, *Chain Store Manual* (1932); F. F. Witte, *Purchasing Policies and Practices of Chain Drug Companies* (1933).

**Chairman**, the president of a meeting, whether convened for the consideration of public affairs, or for the despatch of business connected with some association, company, or committee. In the case of public bodies and companies, the chairman is usually elected for a definite period, according to statute or to the by-laws governing his appointment. In the case of a public meeting, the chairman is usually selected by the promoters of the meeting. The essential duty of the chairman is the maintenance of order. He regulates the order of business; he calls upon the speakers previously selected; or, if the meeting is an open one, decides which of the members rising to speak shall be heard. In the case of equality of votes he is entitled to a casting vote. See PARLIAMENTARY LAW; SPEAKER.

**Chaise**, (French), a light, hooded two- or three-wheeled vehicle. The *post-chaise* of the 18th and 19th centuries was a closed four-wheeled carriage with two or four horses, and driver as postilion.

**Chaka**. See Zulus.

**Chalaza**, the first layer of albumin deposited upon the yolk of an egg as it descends the bird's oviduct. In botany the chalaza is the point of union of the nucellus and the integuments of an ovule.

**Chalazogamy**, in botany, is fertilization through the chalaza instead of through the micropyle, as is usually the case (see OVULE). True chalazogamy occurs in the birch, alder, hornbeam, hazel, walnut, and Casuarina.

**Chalcedon** (more correctly **Chalchedon**), now *Kadikoi*; p. 30,000, a Greek city on the shore of the Propontis or Sea of Marmora, at the entrance of the Bosphorus, nearly opposite Byzantium. It was a colony from Megara, founded in 685 B.C. With the formation of the province of Bithynia it became (74 B.C.) part of the Roman empire. It was captured by Gothic invaders in A.D. 156, and by Chosroes of Persia in A.D. 616, after which it declined, until it was demolished by the Turks. The *Council of Chalcedon* was the fourth ecumenical council, and was assembled (A.D. 451) by the Emperor Marcian for the purpose of drawing up a form of doctrine in regard to the nature of Christ which should equally avoid the errors of the Nestorians and the Monophysites.

**Chalcedony**, a mineral consisting of silica, and occurring in fibrous or minutely crystal-

line condition, never in well developed crystals. It derives its name from Chalcedon in Bithynia, near which it is found in abundance. It is harder than steel, and assumes many varieties of form and color, as Agate, Carnelian, Plasma, Onyx, and Sard. The name 'chalcedony' is usually reserved for specimens which are white, gray, or bluish gray in color and translucent.

**Chalcedonyx**, name given to agates formed of a white opaque chalcedony, alternating with a grayish translucent chalcedony.

**Chalchihuitl**, a mineral much prized by the ancient Mexicans, considered by some to be a variety of jadeite, and by others a kind of turquoise. It is a green-colored, fine-grained stone, and was obtained near Santa Fe.

**Chalcidice**, peninsula in Macedonia, between the Thermaic (Salonica) and Strymonic (Rendina) Gulfs, which runs out into the sea in three projecting promontories.

**Chalcis**, or **Egripo**, chief town of the island of Eubœa, Egripo, or Negropont, Greece, on the Strait of Euripus, here only 120 ft. wide. In the 7th and 6th centuries B.C. it enjoyed much prosperity. About the end of the 7th century B.C. Chalcis was engaged in a prolonged war with its neighboring city Eretria. In the Middle Ages it was prosperous under the Venetians, who held it for nearly three centuries, until its conquest by the Turks in 1470; p. 20,000.

**Chalcis**, a typical genus of a large family of hymenopterous insects, not unlike small wasps. The family numbers many thousand species, and has this great importance that the larvæ of its members are parasitic in the eggs, larvæ, or pupæ of other insects.

**Chalcocite**, a mineral belonging to the copper ores,  $\text{Cu}_2\text{S}$ , carrying about 80 per cent. of that metal. It is a black metallic, brittle mineral. See COPPER.

**Chalcondylas**, or **Chalchondylas**, **Demetrius** (1428-1511), Hellenic grammarian, was born at Athens, but took refuge in Italy in 1447. He published his *Erotemata* in 1493, and produced the first editions of Homer (1488), Isocrates (1493), and Suidas (1499).

**Chalcopyrite**,  $\text{CuFeS}_2$ , is an important copper ore, in which the amount of the metal is extremely variable. It is a yellow, metallic mineral, very brittle, resembling common iron pyrite, and is widely distributed. See COPPER.

**Chaldeæ**, a province of Babylon, bounded by the lower course of the Euphrates, the head of the Persian Gulf, and the Arabian

Desert. In a wider sense the term is applied to the empire of Babylon generally. The *Chaldeans* were the ruling class at Babylon. See BABYLONIA; ARAM.

**Chaldir-gol**, the second largest lake in Transcaucasia, 35 m. n. of Kars, 12 m. long, with a maximum breadth of 10 m., and an area of 33 sq. m.

**Chaldron**, an old measure used in selling coal, containing 36 heaped bushels (= 25½ cwt).

**Chalet**, the wooden hut of the Swiss herdsmen on the mountains. The term is also extended to Swiss dwelling houses generally, and to picturesque villas built in imitation thereof.

**Chaleur Bay**, an inlet of the Gulf of St. Lawrence, between the Gaspé district of Quebec and New Brunswick, Canada. It is 90 m. from e. to w., and from 12 to 20 m. wide. It was visited by Jacques Cartier in 1535.

**Chalfont St. Giles**, village, England, in Buckinghamshire; 16 m. s.e. of Aylesbury. Here Milton fled to escape the great plague, and here (1665) he finished his *Paradise Lost* and wrote part of *Paradise Regained*; p. 1,700.

**Chalgrove**, village, England, in Oxfordshire; 10 m. s.e. of Oxford. Here, on June 18, 1643, in a battle between the Royalists and the Parliamentary forces, John Hampden was mortally wounded.

**Chaliapin**, **Feodor Ivanovitch** (1873-1938), Russian operatic basso, was born in Kazan. In 1899 he appeared as guest-artist at the Imperial Opera, Moscow. His first appearance in New York was in 1907-8, and after 1921 he became an annual visitor to that city and Chicago. He excelled in the interpretation of Russian types, his most famous rôle being Boris Godounoff.

**Chalice** (Latin *calix*, 'a cup'), the vessel containing the wine used in the eucharist. In early Christian times chalices were made of wood, clay, glass, agate, silver, and gold, but gold and silver came at length to be almost exclusively used.

**Chalk**, a soft, earthy, finely granular variety of limestone, white, grayish white, or yellowish in color. It is an exceedingly pure carbonate of lime, in some cases containing less than one per cent. impurities. Chalk is formed chiefly by sea-bottom accumulations of the shells of small Foraminifera, combined with numerous minute organisms known as coccoliths and rhabdoliths, fragments of molluscan shells, the siliceous spicules of sponges, and shells of Radiolaria. Chalk occurs extensively in England, where at Flamborough

Head, Beachy Head, and Shakespeare's Cliff at Dover it fronts the sea in noble headlands, which from their white color gave England the ancient name of Albion. In the United States, chalk formations are found in Iowa, Texas, Arkansas, Nebraska, and South Dakota. In geology, the chalk is the most familiar member of the Upper Cretaceous formation. Some geologists have divided it into three groups—the Lower, Middle, and Upper Chalk. (See CRETACEOUS SYSTEM.)

The uses of chalk are many. When mixed with a bonding substance it finds wide application as a writing material. When burned it furnishes quicklime, and when mixed with clay, Portland cement. It is used as a dressing on clayey ground, and the harder, less pure varieties are employed as building stone. *Whiting*, prepared by grinding chalk and washing it free of grit, is used for polishing glass and silver and for making putty. Purified chalk is used in the manufacture of tooth powder, and medicinally as a mild astringent.

*Black chalk*, a mineral quite different from common chalk, is essentially a kind of slaty clay, of a grayish-black color, derived from the carbon that it contains. It is used for drawing and as a black color in painting. (See CRAYON.) *French chalk* is a powdered form of steatite or soapstone (see TALC). *Red chalk* is a soft, red, ochreous clay. See LIME; LIMESTONE.

**Challemel-Lacour, Paul Amand** (1827-96), French statesman and writer, was born in Avranches. On the fall of Napoleon III. (1870) he became prefect of the Rhône, but resigned in 1871. With Gambetta he established the *République Française*, becoming editor-in-chief. His *Œuvres Oratoires* were published in 1897.

**Challener, Frederick Sproston** (1869), Canadian artist, was born in Whetstone, England, and migrated to Canada in 1883. He was awarded medals at the Pan-American Exposition, Buffalo (1901), and the Louisiana Purchase Exposition (1904).

**Challenge**, an oral or written request, addressed by one person to another, to fight a duel. Such a challenge is now considered a crime in almost every civilized country. It is a high offence at common law, and is punishable by special laws in most of the States. (See DUEL.) In legal practice, a challenge is an objection made to the jurors who have been arrayed to pass upon a cause on trial. A challenge may be made by either party to

a suit, but it must be made before the jurors are sworn. See JURY.

**Challenger Expedition**, a circumnavigating scientific exploration of the open sea sent out by the British government in 1872-6. The ship was given in charge to a naval surveying staff under Captain Nares; and to a scientific staff, with Sir C. Wyville Thomson at the head, for the purpose of sounding the depths, mapping the basins, and determining the physical and biological conditions of the Atlantic, Southern, and Pacific Oceans. The *Challenger* weighed anchor at Sheerness on Dec. 7, 1872, and on May 24, 1876, dropped anchor at Spithead, having in those three and a half years cruised over 68,900 nautical m.

**Challis, James** (1803-82), English astronomer, was born in Braintree, Essex. He was graduated from Cambridge (1826), where he was appointed professor of astronomy (1836) and director of the observatory. In 1846 he twice unknowingly 'noted' the planet Neptune before its discovery at Berlin on Sept. 23 of that year.

**Challoner, Richard** (1601-1781), English Roman Catholic prelate, was born in Lewes. He was created bishop of Debra, in Libya, in 1730 and vicar apostolic of the London district (1758). He wrote *The Garden of the Soul* (1740), and a translation of *The Imitation of Christ* (1706).

**Chalmers, Alexander** (1759-1834), Scottish biographer and miscellaneous writer, was born in Aberdeen. His more permanent place in literature depends on his *General Biographical Dictionary* (32 vols., 1812-17).

**Chalmers, George** (1742-1825), Scottish antiquary, was born in Aberdeen. Of his thirty-three works the chief are *Caledonia, an Account, Historical and Topographical, of North Britain*; *Lives of Defoe, Paine, Ruddiman*, and *Mary Queen of Scots*.

**Chalmers, George Paul** (1833-78), Scottish painter, was born in Montrose. He was an exponent of the Scottish feeling for romance and dreamy mysticism, which he expressed with Titian-like coloring. His *Legend*, in the Edinburgh National Gallery, is a fine example.

**Chalmers, Thomas** (1780-1847), Scottish divine, was born in Anstruther, Fifehire. In 1815 he was translated to the Tron Church, Glasgow, and took the city by storm with his eloquent preaching. In 1834 Chalmers was made convener of the Church Extension Committee; and after seven years' labor he announced that upward of \$1,500,000 had



been collected, and 220 new churches built. Meanwhile, the Evangelical party had become predominant in the General Assembly and on May 18, 1843, Chalmers, followed by 470 clergyman, left the Established Church, and entered upon the organization of the Free Church of Scotland (see PRESBYTERIANISM). He resigned his professorship, and became principal of the New College of the Free Church.

A fine orator, and one of the most potent Scottish forces in the 19th century, Chalmers was greater than his books. His publications include: *Evidence and Authority of the Christian Revelation* (1814); *Astronomical Discourses* (1817), deservedly popular, and frequently reprinted; *Defence of Church Establishments* (1838). Consult W. Hanna's *Memoirs of the Life and Writings of Dr. Chalmers*; Blaikie's *Thomas Chalmers*.

**Chaloner, Sir Thomas** (1521-1565), **The Elder**, English diplomat and author, was born in London, was educated at Oxford, and entered the service of Henry VIII. Sent by the King as ambassador to the Emperor Charles V. On the accession of Elizabeth he was appointed ambassador, first to the Emperor Ferdinand, and then to the court of Spain.

**Châlons-sur-Marne**, capital of the department Marne, France, on the River Marne; 92 m. e. of Paris. It contains a cathedral (St. Etienne) of the 13th-17th centuries. The Huns were defeated and the power of Attila broken by a battle fought near the town in 451. In 1430, and again in 1434, the English unsuccessfully besieged it. In the European War, the town was occupied by the Germans on Aug. 28, 1914, but they were driven out a few days later in the Battle of the Marne; p. 31,367.

**Chalon-sur-Saône**, town, department Saône-et-Loire, on the Saône, where the Canal du Centre joins that river; 35 m. n. of Macon. It was the second city of the *Ædui* (*Cabillonum Æduorum*) in the time of Cæsar, and was destroyed successively by the Vandals, Huns, and Burgundians. Several church councils were held here; p. 31,550.

**Chalybeate Waters**, or **Iron Waters**, are mineral or medicinal waters which naturally contain iron compounds in solution, either alone or with other salts, the proportion of iron ranging from .003 to .012 per cent. They have an astringent or styptic taste, and a sparkling appearance when excess of carbonic acid is present. They are of thera-

peutic value as a tonic in cases of general debility and anæmia. Among the best known carbonated chalybeate waters are those of Tunbridge Well, Spa, Homburg, Marienbad, Schwalbach, Nauheim, and St. Moritz in Europe; and Bailey Springs, Ala., and Rawley Springs, Va., in the United States. See MINERAL WATERS.

**Chalybes**, an Asiatic people who dwelt in Pontus, on the n. coast of Asia Minor. They were famous as iron workers; hence the word 'chalybeate.'

**Cham**, the pseudonym of Amédée de Noé (1819-79), French caricaturist. He excelled in humorous drawings of contemporary Paris life, and from the age of twenty-four until almost the close of life he was connected with the *Charivari* and the *Journal des Pèlerinages*.

**Chamæleon**, a small southern constellation between Hydrus and Argo, announced by Bayer in 1603.

**Chamærops**, a genus of palms, remarkable for its wide range into northern climates throughout the world, and of which one species, *C. humilis*, is the only palm truly indigenous to Europe.

**Chamalhari**, a peak in the Himalayas on the northwest frontier of Bhutan; 140 m. e. of Mount Everest. It rises to an altitude of 23,944 feet just above the main route from India to Gyantse.

**Chamba**, or **Chumba**, native state, Punjab, India, lying to the s. e. of Kashmir, and n. of Kangra district; area, 3,200 sq. m.; p. 141,867.

**Chambal**, or **Chumbal**, river, Central India, a principal tributary of the Jumna, rises in the Vindhya Range, 2,019 feet above sea level.

**Chamber**, a term often applied to a legislative or public body, as Chamber of Deputies, Chamber of Commerce. See CHAMBERS.

**Chamber** of a firearm is the name given to that part of the bore which contains the powder, when its diameter is not the same as the caliber of the gun. See GUNS.

**Chambered Nautilus**. See **Nautilus**.

**Chamberlain**, an officer appointed by a king or nobleman to perform domestic and ceremonial duties, or by a corporation or municipality to receive rents and fees.

The Lord Chamberlain has been one of the principal British officers of state from at least the 13th century, and in 1406 Parliament declared that he should be a member of the council *ex officio*. Though he has long ceased

to have any share in the responsibilities of government, he is still an officer of high standing in the royal household.

The Lord Great Chamberlain is the sixth great officer of state in Great Britain, to whom belong the government of the Palace of Westminster and the supervision of its officials.

**Chamberlain, Right Hon. (Arthur) Neville** (1869-1940), son of Joseph Chamberlain and half-brother of Sir Austen Chamberlain, became Lord Mayor of Birmingham and entered the House of Commons as a Conservative in 1918. He rose rapidly to the Cabinet, serving first as Postmaster-General, then Chancellor of the Exchequer (1923-24). He returned to the Treasury in 1931, in the MacDonald National Government, and, although boasting a surplus, refused to meet the payment on the war debt due to the United States. In 1935, he presented an economy budget which lowered income tax rates. He became Prime Minister 1937, succeeding Stanley Baldwin, and was an important figure at the Munich Conference, 1938. He led Britain as she entered the war, 1939, retiring in 1940.

**Chamberlain, Daniel Henry** (1835-1907), American lawyer and legislator, was born in West Brookfield, Mass. In 1866 he became a cotton planter in South Carolina; was attorney-general of the State from 1868 to 1872, and governor from 1874 to 1876.

**Chamberlain, George Earle** (1854-1928), American legislator, was born near Natchez, Miss. He was elected governor of Oregon for the terms 1903-11, but resigned in 1909 upon his election as U. S. Senator for the term ending 1915. He was reelected for the term, 1915-21, and was a member of the U. S. Shipping Board (1921-3).

**Chamberlain, Right Hon. Joseph** (1836-1914), British statesman, was born in Camberwell, a suburb of London. In 1880 Gladstone made him President of the Board of Trade, and included him in the Cabinet. He came to be regarded as the leader of the extreme Radical Party. When Gladstone formed his first Home Rule Administration, in January, 1886, he became president of the Local Government Board; but resigned on March 26 because of his strong objections to Gladstone's Home Rule measures for Ireland. Toward the end of 1887 Chamberlain went to Washington as one of the British plenipotentiaries to discuss the question of Canadian fisheries with the United States Government. When, in 1895, the Marquis of Salisbury was returned to power for the third time, Cham-

berlain chose the Colonial Office. Almost his first duty was to disavow and denounce the Jameson Raid (1896). He insisted upon the appointment of the South African Committee, of which he was made a member against his own wish (1897). The awakening of a strong imperial spirit among the colonies, which culminated in the despatch of thousands of volunteers from Canada, Australia, and New Zealand to fight in South Africa, was also attributed to his policy and inspiration. In 1903 Chamberlain startled friends and foes alike by his scheme for preferential treatment of colonial imports, and such protective legislation as might aid native manufactures and prevent 'dumping' of foreign manufactured goods. The Birmingham University owed its foundation (1900) largely to his efforts, and he became the first chancellor. He died in London on July 3, 1914, and was buried in Birmingham. He wrote *Municipal Institutions in America and England*.

**Chamberlain, Right Hon. Sir [Joseph] Austen** (1863-1937), British statesman, the son of Joseph Chamberlain, was born in Birmingham. He was Civil Lord of the Admiralty (1895-1900), financial secretary to the treasury (1900-2). Postmaster-General (1902-3), and Chancellor of the Exchequer (1903-6), under the Unionist administration. In the first Coalition government, 1915, he entered the Asquith cabinet as Secretary of State for India but resigned in 1917. In 1918 he became a member of the War Cabinet and in 1919 again became Chancellor of the Exchequer. On the resignation of Bonar Law in 1921 he became leader of the House of Commons and Lord Privy Seal, but was superseded by Bonar Law in 1922. He was Foreign Secretary in the second Baldwin cabinet in 1924-9, a position he filled most acceptably both at home and abroad. In 1925 he received the Garter for distinguished services in connection with the Locarno Treaty, and was also one of the signers of the Kellogg Pact in 1928.

**Chamberlain, Joshua Lawrence** (1828-1914), American soldier and legislator, was born in Brewer, Me. During the Civil War he served on the Union side, and was awarded a Congressional Medal of Honor for heroism at Gettysburg. After the war he was governor of Maine for four terms (1866-71), and from 1871 to 1883 was president of Bowdoin College.

**Chamberlain, Montague** (1844-1924), Canadian-American ornithologist, was born in St. John, N. B. He edited the revised edi-

tion of Nuttall's *Birds of the United States* (1896). After service in the Canadian army, he retired with the rank of captain. He became assistant secretary of Harvard Univ. in 1889 and later secretary of the Lawrence Scientific Sch. His works include *Canadian Birds*, 1870; *The Penobscot Indians*, 1899. Many of his works on bird life have appeared in various periodicals.

**Chamberlain, Sir Neville Bowles** (1820-1902), British general, a dashing leader of Indian irregular horse, was born in Brazil. He entered the Indian army, served in the Afghan campaign at Ghazni, Kandahar, and Kabul (1842), being wounded six times. During the mutiny (1857) he was severely wounded at Delhi. In 1900 he was made a field marshal.

**Chamberlin, Thomas Chrowder** (1843-1928), American geologist. He was geologist of the Peary Relief Expedition in 1894 and research associate in Carnegie Institution.

**Chamber of Deputies**, the lower of the two national legislative bodies in certain European and Latin-American countries, as France, Italy, Spain, Portugal, Roumania, Mexico, and Venezuela. It is the popular branch of the legislature, and in general the one originating financial measures.

**Chambers** are places where legal or judicial business is transacted in private, as distinct from open court. Judicial business is said to be done 'in chambers' when a judge holds an informal sitting during a court vacation. Likewise a trial with closed doors is said to take place *in camera*, 'in a chamber.' In England, rooms called chambers are attached to the various courts, in which informal and incidental matters are transacted in the presence of a master of court or chief clerk.

**Chambers, Charles Haddon** (1860-1921), English playwright, born and educated in Sydney, N. S. W. He settled permanently in England in 1882, becoming a journalist, and later a dramatist.

**Chambers, Robert** (1802-71), Scottish publisher and author, brother of William Chambers, was born in Peebles. He entered the publishing business in Edinburgh, and issued *Illustrations of the Author of 'Waverley'* in 1822. Scott and others interested themselves in him, and he found congenial themes in Scottish archæology, history, and biography. A unique work, the fascinating *Book of Days* (1863-4), shows the writer at his best. Consult William Chambers' *Memoirs of himself and Robert Chambers*.

**Chambers, Robert William** (1865-1933), American author and painter, was born in Brooklyn, N. Y. His first book, *In the Quarter*, inspired by his student experiences in Paris, was brought out in 1894, and was followed by a volume of short stories, *The King in Yellow*, which met with immediate success. Among his published works are: *The Red Republic* (1894); *The Fighting Chance* (1906); *The Younger Set* (1907); *Tree of Heaven* (1907); *The Firing Line* (1908); *The Hijackers* (1923). He is also the author of a play, *The Witch of Ellangowan*, written for Ada Rehan and produced at Daly's Theatre, New York.

**Chambers, William** (1800-83), Scottish publisher, brother of Robert, was born in Peebles. He founded *Chambers' Edinburgh Journal* on Feb. 4, 1832. A pioneer of popular literature, *Chambers' Journal* had continuous prosperity, its circulation soon rising from 30,000 to 80,000. Other works conceived in the same spirit were immediately successful, including *Information for the People*; the Educational Course Series. He made numerous contributions to literature, including, *Things as They Are in America* (1854), an account of a visit to the United States. He was made LL.D. of Edinburgh University in 1872. A statue has been erected to his memory in that city.

**Chambers, Sir William** (1726-96), English architect, was born in Stockholm. He was first treasurer of the Royal Academy (1768), and in 1775 designed Somerset House, London. He was the most successful architect of the reign of George III. His *Treatise on Civil Architecture* was long a text book.

**Chambersburg**, borough, Pennsylvania, county seat of Franklin Co., 50 m. s.w. of Harrisburg. In 1864 the Confederates burned part of the town; p. 14,852.

**Chambers of Commerce** are associations of merchants, manufacturers, financiers, and others formed for the protection and promotion of commercial interests. They endeavor to further the interests of trade in their districts by making representations, by petition or deputation, to the government; by gathering information and collecting and publishing statistics; by assisting, informally, in the preparation of legislation dealing with mercantile questions; by discussion intended to influence or to create public opinion; by managing an employment bureau for men out of work; and, of late, by fostering commercial and technical education. Some chambers, such as those of London and New York, have

taken a prominent part in the establishment of boards for the settlement of labor disputes, and also of chambers of arbitration, to decide questions arising out of commercial transactions which would otherwise come before the courts of law. About the year 1850 a body was instituted at Marseilles, France, which may be regarded as the earliest chamber of commerce. French chambers of commerce have a quasi-official character which has been copied in most Continental countries. The chambers of commerce of the United States, the United Kingdom, and the British colonies are voluntary associations, and have no official status. One of the first chambers of commerce in Great Britain, if not the first, is that of Glasgow, which was founded in 1783. The first to be established in the United States was the New York Chamber of Commerce, which was founded in 1768, incorporated by George III. in 1770, and reincorporated by the State of New York in 1784. There are chambers of commerce in the chief cities of the United States, and even in many of the smaller towns.

The Chamber of Commerce of the United States was organized in Washington, D. C., on April 23, 1912, at a national conference called by the President of the United States. Its purpose is to serve the nation as a local chamber serves its community, and to 'nationalize the foreign and domestic commerce of the country by co-operative effort among commercial organizations.'

**Chambertin**, a famous red Burgundy wine, obtained from a vineyard (62 acres) of that name in the French department of Côte-d'Or; 7 m. s. of Dijon by rail.

**Chambéry**, capital of the former duchy of Savoy, and of the present department of Savoie, France; 55 m. s.e. of Lyons. Notable edifices are the Cathedral (15th century), the Palace of Justice, and the old Castle of the dukes of Savoy; p. 22,958.

**Chambezi**, the farthest head stream of the Congo River, rises in the highlands s. of Tanganyika.

**Chambly River**. See **Richelieu**.

**Chambord**, a celebrated château in the French department of Loir-et-Cher, about 10 m. e. of Blois, in the midst of a walled park of 13,000 acres. Commenced by Francis I. in 1526, it is a remarkable structure, illustrating Renaissance principles grafted on the French mediæval type. Chambord, the 'Versailles of Touraine,' was a residence of the French kings down to Louis xv., who gave it to Marshal Saxe; and here in 1670 Molière gave the first

representation of his *Bourgeois Gentilhomme*.

**Chambord, Henri Charles Dieudonne, Comté de** (1820-1883), posthumous son of the Duc de Berri, and grandson of Charles x. of France, was born in Paris. On the day of his baptism the 'Child of Miracle' was presented by the Legitimists with the Château of Chambord; hence in 1844 he dropped the title of Duc de Bordeaux. He had three times a chance of regaining the crown of his ancestors but each time he threw away his opportunities. He died at his castle of Frohsdorf, in Lower Austria. The Comte de Paris inherited his claims. See **BOURBON**. Consult **Comte de Falloux** *Mémoires d'un Royaliste*.

**Chambre Ardente**, (French, 'fiery chamber') was the name applied to a French court, first established by Francis I. in 1535, for the suppression of the new Protestant 'heresy.' It was so called on account of the frequency with which it pronounced the sentence of death by burning.

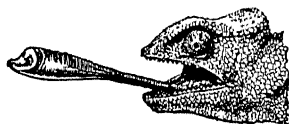
**Chamdo**, or **Chiamdo**, town, Tibet, 400 m. n.e. of Lhasa, on the Lan-tsang (Upper Mekong). It has several Lamaist monasteries.

**Chameleon**, or **Chamæleon**, a large genus of lizards, forming a distinct family. Distinguishing features are the soft, tuberculated skin, with its power of changing color; the



*The Chameleon.*

coiled tail, adapted for curling round the branches of trees; the absence of an external ear-drum or tympanic membrane; the long, worm-like insect-catching tongue, capable of extremely rapid protrusion.



*Tongue of Chameleon extended.*

Except as regards tongue and eyes, the chameleons are very sluggish. They are strictly arboreal lizards, moving very slowly, in perfect silence, and waiting rather than

hunting for their insect prey. Chameleons are especially at home in the Ethiopian region, but may occur beyond its limits. The commonest of the species is *C. vulgaris*, abundant in Africa, and also found in Southern Europe (Andalusia). A species of lizard (*Anolis*) is popularly called a chameleon in the United States.

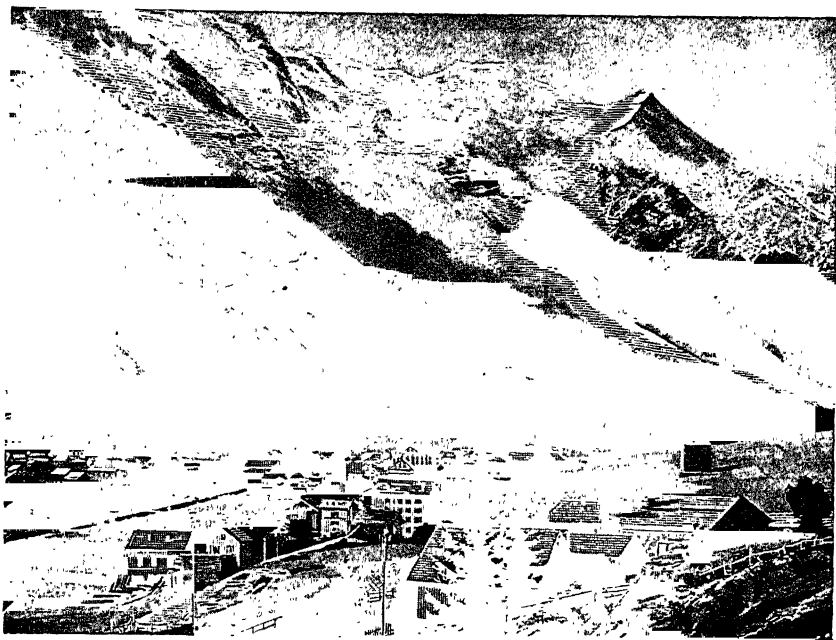
**Chamfer**, in architecture, an angle which is slightly pared off. A large chamfer, as in a wall at the window opening, is called a *Splay*. The chamfer is sometimes made slightly concave, in which case it is called a *hol-low* chamfer.

**Chamfort**, Nicolas (1741-94), French

*lirhoe*, *La Lisonjera*, many other piano-forte pieces, and a large number of songs.

**Chamisso**, Adelbert von (1781-1838), German author, whose real name was LOUIS CHARLES ADELAIDE DE CHAMISSO, was born in Boncourt, Champagne, his family being of Portuguese origin. He is perhaps best known as the author of *Peter Schlemihls wundersame Geschichte* (1814), the story of a man who sold his shadow to the devil, which has been translated into almost all the languages of Europe. Consult *Lives* by Fulda and by Lentzner.

**Chamois**, (*Rupicapra* or *Antilpoe*; German *Gemse*), a goat-like species of antelope,



Chamonix and the Mont Blanc Range.

author, was born near Clermont in Auvergne. His chief works were collections of maxims and of anecdotes, including a brilliant series of Parisian society portraits.

**Chaminade**, Cécile Louise Stéphanie (1861-1944), Fr. pianist and composer, was born in Paris, France. She made her first tour of the United States in 1908-9, with a program confined to her own compositions. Although an orchestra director of considerable ability, she is best known as a composer. Among her compositions are: *Cal-*

*inhabiting the Alps and other high mountains of Central and Southern Europe. The chamois is about the size of a large goat, but the neck is longer in proportion, and the body shorter; the horns on both sexes are seldom more than 6 or 7 inches long, black, rising nearly straight up from the forehead, and so bent back at the tip as to form a hook. The usual summer resort of the chamois is in the higher regions of the mountains, not far from the snow line, and it is often to be seen lying on the snow. In winter it descends to the*

higher forests. The chamois is of extraordinary agility, and it passes readily up or down precipices which almost no other quadruped could attempt. The scent, sight, and hearing of the chamois are extremely keen.



*Chamois.*

**Chamomile.** See **Camomile**.

**Chamonix, Chamounix, or Chamouni**, a celebrated valley and village among the French Alps, in the department of Haute-Savoie, 40 miles southeast of Geneva, at an elevation of about 3,400 ft. above sea level. On the north side lie Mont Brévent and the chain of the Aiguilles Rouges; and on the south, the giant group of Mont Blanc, from which enormous glaciers glide down, even in summer, almost to the bottom of the valley. From this point Mont Blanc is usually ascended; p. 3,500.

**Champagne**, district and ancient province of France, surrounded by Luxemburg, Lorraine, Burgundy, Ile de France, and Orléanais; now forming the departments of Marne, Haute-Marne, Aube, and Ardennes, and parts of Yonne, Aisne, Seine-et-Marne, and Meuse. Its chief towns were Troyes, Bar-sur-Aube, Leon, and Rheims. The province was about 180 m. long by 150 broad, its surface largely plain with ranges of hills, especially in the north and east. Champagne was the scene of important action all through the course of the GREAT WAR (see EUROPE, GREAT WAR OF). Here the Allies were driven back just before the First Battle of the Marne (q. v.) and here in September, 1914, Langle's 4th French Army took its stand against the Duke of Württemberg (See AISNE, BATTLES OF). An account of the subsequent actions in the region follows. The French resumed active warfare in Northern Champagne during January and February, 1915. Here the same armies faced each other as had been holding the

lines of the First Battle of the Aisne. The direct, French objective was to push back the enemy three miles, and so threaten his lateral communications. The general advance began on Feb. 16. It was of the familiar type—a violent bombardment of the German positions followed by an infantry charge. First one and then another of the little woods and ridges were carried, but by March 24, not a point had been won which enabled the French to threaten seriously the Bazancourt-Grand Pré railway. However the German losses were out of all proportion to those of the French. The second Champagne offensive came at the end of the summer of 1915. The striking force of the French movement was Langle de Cary's 4th Army. Pétain's army was in reserve on this front. Opposed to the French were the armies of Von Heeringen and Von Einem.

On Thursday, Sept. 23, the main bombardment began. From La Bassée to Arras, and along the Champagne front, hell was loosed from thousands of pieces. On Sept. 25 the infantry attacked and at the end of the day the French had advanced an average of two and one-half miles on a 15-mile front. The next day the left wing cleared all the summits from Auberive to Souain; the centre cleared the woods east of Souain, and joined up with the right of the left wing on Hill 193. The so-called 'Camp of Sadowa' with great quantities of material was taken. During the latter part of September the Germans received reinforcements from Russia, and they were soon ready to launch a counter-stroke on the Champagne front. On the night of Oct. 18, the Germans began a bombardment upon the six miles of French front from La Pompelle to the village of Prosnes. Just after dawn the German infantry attacked in four successive lines and effected a lodging in some parts of the advanced trenches. In the afternoon, however, the French reinforcements pushed through the curtain of fire, counter-attacked and drove back the assailants, inflicting enormous losses. The next day another effort was made but no man got further than the wire entanglements in front of the trenches. In two days' battle two German divisions were destroyed. The German attempt to break the French line at Tahure by a frontal advance, combined with a flanking attack from the Mesnil failed in its main purpose, but by driving the French from the top of the Butte, it gave a further lease of life to the Bazancourt-Grand Pré railway, and eased the German position in the win-

ter stagnation that followed. According to Nivelle's plan of the Second Battle of the Aisne (see AISNE, BATTLES OF), Anthoine's 4th French Army, east of Rheims, in the Champagne opened the attack on the Moronvilliers *massif* on the second day of the battle, April 17, 1917, the object being to distract the enemy's counter-attack on the Aisne, and to protect the right flank of the Aisne armies. As the first phase of the action came to an end, Anthoine had won most of his objectives east of the Thuizy-Nauroy road. The better part of the Moronvilliers *massif* was now in the hands of the French, but not enough to complete any strategical purpose. On April 30 the attack was renewed by the French. Sunday, May 20, was the culmination of the Moronvilliers battle, and the whole summit ridge of the *massif* was secured. Since the opening of this section of the battle on April 17, there had been taken, 6,120 prisoners, including 120 officers, 52 guns, 42 trench mortars, and 103 machine guns. (See AISNE, BATTLES OF).

On June 9, 1917, General Anthoine was transferred to the First French Army in Flanders and General Gouraud took command of the 4th French Army in the Champagne. The new general was not satisfied with his front, especially between Mont Cornillet and Mont Blond. He started an attack just before dawn on June 21. The operation was completely successful—the Flensburg and Blond trenches were won. Von Bülow brought up three fresh divisions with the intention of regaining the crest line. But Gouraud anticipated his plans. On July 12 and 13 the French guns deluged with shells the position of the new divisions. On July 14—the *jour de France*—Gouraud attacked at 7:30 in the evening on two fronts and within half an hour he had secured all his objectives and taken some hundreds of prisoners. Following the Third Battle of the Aisne (see AISNE, BATTLES OF), Ludendorff's plan of attack was to strike out from the salient in which Von Boehn's 7th Army had been entrapped, and to press beyond the Marne and cut the great lateral railway from Paris to Nancy. At the same time Von Mudra, now in command of Fritz von Bülow's First Army, and Von Einem's Third Army, was to strike east of Rheims between Prunay and the Argonne for the purpose of dividing the French front into two parts never again to be joined. The attack was opened by a heavy artillery bombardment at midnight July 14, 1918, and at 4

A.M. on the 15th the infantry crossed the parapets. Gouraud's counter-bombardment dislocated the German attack before it began and the French losses were trifling. On Sept. 25, 1918, the Germans between the North Sea and the Moselle held a position that was difficult, but not hopeless. Their worst anxiety was on behalf of their left about Mézières and Longuyon, which covered the vital railway of the south, and the centre from Douai to St. Quentin, which likewise covered the roads and railway supplying the Siegfried zone. In the battle which Foch was about to wage against the whole German front these points became the main objectives. In the area about Champagne were located Von Mudra's First German Army north and south of Rheims, and Von Einem's Third German Army in the rest of the area, joining Von der Marwitz's Fifth Army north of Verdun. Opposed to Von Einem was Gouraud's 4th French Army. Pershing, with the First U. S. Army, and Gouraud's army were to open battle in an attack west of the Meuse in the direction of Mézières.

At 2:30 A.M. Sept. 26, the guns of both armies began the severest kind of a 'preparation' between the Suippe and Verdun. At 5:30 A.M., on a front of forty miles, the infantry of the two armies crossed the parapets. The first rush took Gouraud's six corps of attack through the front positions which had been ceaselessly strengthened ever since the Champagne battle of September, 1915. His attack was a complete surprise; and by evening he had broken the back of a position which Von Einem had thought impregnable. By Oct. 3 he had reached the southern bank of the Arne and compelled a withdrawal of the German right. The next day the enemy began to retire on the whole front between Rheims and the Argonne. On Oct. 8, the French were two miles north of the Arne, and on the 10th with Pershing's army, were able to advance and seize the Grand Pré defile, through which ran a lateral railway that had, for some days, been denied the enemy. The next day they took Challeranges. Gouraud, Pershing, Guillemat, and Mangin were advancing in linked movement. The death-blow had been struck to the remnant of Germany's military power. By the 10th of October Gouraud and Pershing had cleared the Argonne Forest (see ARGONNE).

Gouraud opened the last stage of the offensive on Nov. 1 by attacking north and east of Vouziers, and the Americans advanced between Olizy and the Meuse. On Nov. 5, the

enemy's resistance was broken on the whole front in the West. The two wings of the German army were separated and were now not in retreat but in flight. For Nov. 14 Foch had planned a great sweep of the Americans northeastward between the Meuse and the Moselle. But this was not to be. Already German surrender hung in the air. On the morning of Nov. 11, 1918, at eleven o'clock, the Armistice went into effect, and peace descended over the battle-field. See EUROPE, GREAT WAR OF.

**Champagne**, a variety of effervescent wine originally produced in the province of Champagne, France, from grapes grown on the slopes of the River Marne and the mountains of Rheims. While the term was formerly limited to the wines produced in that district, at the present day it refers to the method rather than the locality of production, excellent champagne now being made in Germany and America.

Champagnes are pale straw or pink in color. The first runnings from the press constitute the *vin de cuvée*, and produce the finest sparkling wine; while the other pressings go to form inferior qualities both of wine and of brandy. The alcoholic strength of champagne is from 9 to 12 per cent. Still or non-effervescent champagne is first racked off in the March after the vintage. Creaming or slightly effervescent champagne (*demimousseux*) has more alcohol, but less carbonic acid gas, than sparkling champagne.

The discovery of champagne, at the end of the seventeenth century, is attributed to Dom Pérignon, a Benedictine monk of the Abbey of Haut Villers, France, who quite by chance found that wine bottled under certain conditions underwent a second process of fermentation, rendering it effervescent. For years the secret of champagne making was kept by the Abbey of Haut Villers, but it eventually became public, and many wine establishments sprang up throughout the province of Champagne. Equally fine champagne is now produced in other sections of France, in Germany, and in the United States.

**Champagne War**, the term applied to the disturbances which arose in the Aube district of France during March and April, 1911. In 1903 a law was passed in France delimiting the area which alone could legally grow grapes for the manufacture of champagne, removed from Aube a lucrative business; hence the outbreaks, which were characterized by much *sabotage*.

**Champaign**, city, Champaign co., Illinois. The University of Illinois is partly in Champaign and partly in Urbana; p. 23,302.

**Champaigne, Philippe de** (1602-74), portrait painter, was born in Brussels. He executed many works for palaces and churches, and for Cardinal Richelieu; and was a distinguished portraitist. Most of his pictures are in the Louvre, including *The Dead Christ* and *Portrait of Cardinal Richelieu*.

**Champ de Mars**, a large parallelogram in Paris, between the Seine and Ecole Militaire, used principally for military purposes and drills. It has been the scene of many events of historic interest. On it stands the Eiffel Tower.

**Champerty**, or **Champarty**, is a legal term denoting assistance rendered to a litigant in a lawsuit by a third party for a consideration which is other than fixed remuneration for work done. The most obvious instance is where the third party is to share in the proceeds of the action, or where the remuneration of an attorney is proportional to the amount recovered. Champerty may then be classed as a special form of maintenance, and is forbidden both by the common law as contrary to public policy, and by many ancient and modern statutes. In some jurisdictions, however, an attorney is now permitted to make a charge varying to a certain extent according to the proceeds of the action; and an agreement only to charge in the event of success is not champertous. A party to an action is not entitled to plead that his opponent has been guilty of champerty, this being quite irrelevant to the original ground of action or defence. A champertous agreement may be validly acquiesced in by one entitled to set it aside, but only if he is fully aware of his legal right so to do. One champertous agreement, cannot, however, be confirmed by another also champertous.

**Champfleury**, called **Jules Fleury-Husson** (1821-89), French writer, was born in Laon. He achieved distinction as a realistic writer of plays and romances, and wrote works on the history of caricature, of literature, and of art.

**Champigny**, town, department Seine France, on the Marne; 6 m. s.e., o. Paris. Two battles were fought here in 1870, during the Franco-German War; p. 10,426.

**Champion**. In the judicial combats of the Middle Ages it was allowed to women, children, and aged persons, except in cases of



high treason or of parricide, to appear in the lists by a representative. Such a defender was called a champion. (See **BATTLE, TRIAL BY**). At a later period, in the age of chivalry, the word champion came to have a more dignified acceptation, and signified a knight who entered the lists on behalf of an injured lady, of a child, or of any one incapable of self-defence (see **CHIVALRY**). In England the crown had its champion, the Champion of England, who challenged, at every coronation at Westminster, all who should deny the king to be the lawful sovereign. The ceremonies of the championship were last exercised at the coronation of George IV.

**Championnet, Jean Antoine Etienne** (1762-1800), French general, was born in Valence (Drôme). In 1798 he was appointed commander-in-chief of the French army in Italy, and defended Rome against the Neapolitans, cleared the Papal States of the enemy, and captured Naples (Jan. 23, 1799). There he proclaimed the Parthenopean Republic.

**Champlain, Lake**, lies in the basin between the Green Mountains and the Adirondacks, partly in Vermont, partly in New York, crossing the Canadian boundary, and draining through the Richelieu River northward to the St. Lawrence. It lies 96 ft. above sea level, stretches north and south for 121 miles, with a maximum breadth of 15 miles and covers an area of 500 square miles. The principal cities on its shores are Burlington, Vt., and on the New York side, Rouse's Point, Plattsburg, and Whitehall, from which a canal extends to the Hudson River. The lake was discovered by Samuel de Champlain in 1609, and French forts were later erected on its shores, at Crown Point (1731) and Ticonderoga (1775). In October, 1776, Benedict Arnold failed to check the advance of a formidable British flotilla on the lake. In the War of 1812 the Americans defeated the British here in the Battle of Lake Champlain (September, 1814) or Plattsburg.

**Champlain, Samuel de** (1567-1635), early French explorer in America, and the 'Founder of New France,' born at Brouage (Saintonge), France. On behalf of Aymar de Chaster, he, with Pontgravé, made a reconnoitering voyage to Canada in 1603, proceeding up the St. Lawrence as far as the site of the present Montreal. Returning to Canada as lieutenant-governor in 1608, he founded Quebec, and thereafter spent most of his life in New France, making various trips, however, to and from France. In 1609 he dis-

covered Lake Champlain (named in his honor), and by taking part in an engagement with the Iroquois began the traditional warfare between the French (allied with the Hurons) and the redoubtable Five (later Six) Nations—a warfare of the greatest significance in the history of New France. In 1612 Champlain had been invested with almost vice-regal power in New France, and until his death, with the exception of the period of English possession (1629-32), he was the dominant figure in the colony. Champlain kept full journals of his voyages and explorations, and these are of the utmost importance to the student of the history of New France. Consult, also, Parkman, *Pioneers of France in the New World*.

**Champlain Epoch**, in geology, a period of post-Glacial time, which has left important deposits around Lake Champlain and elsewhere. Old lake basins now dried up, and raised beaches and deposits of littoral character, are the principal traces left by the Champlain Epoch.

**Champlin, John Denison** (1834-1915), American author, born at Stonington, Conn., and graduated (1856) at Yale. He was joint editor of the *Liber Scriptorum* (1893), and an associate editor of the *Standard Dictionary* (1892-4).

**Champney, Benjamin** (1817-1907), Amer. painter, born at New Ipswich, N. H., Mr. Champney was a founder, and at one time president, of the Boston Art Club, and in 1900 he published his *Sixty Years' Memories of Art and Artists*.

**Champney, James Wells** (1843-1903), American painter, was born in Boston, Mass. In later years he became noted as a rapid and clever worker in pastel portraiture. He was made an associate of the National Academy in 1882.

**Champneys, Basil** (1842-1935), Eng. architect and author, born at Lichfield. Among the public buildings of his designing are the Divinity and Literary Schools, Cambridge. Champneys has also built many churches, and is cathedral architect at Manchester. His books are *A Quiet Corner of England* (1875), *Henry Merritt* (1879), and *Coventry Patmore* (1901).

**Champollion, Jean François** (1790-1832), French Egyptologist, known as 'Champollion le Jeune,' born at Figeac (Lot). He studied Coptic in Paris, and was later made professor of history at Grenoble (1816). By comparison of MSS. and monuments he inferred the essential identity of the three sys-

tems of Egyptian writing, and in the Rosetta inscription he discovered the twenty-five letters mentioned by Plutarch. He was appointed to a new chair of Egyptology in the Collège de France (1830).

**Champollion-Figeac, Jean Jacques** (1778-1867), French antiquary, born at Figeac (Lot). He was librarian and Greek professor at Grenoble, and in 1828 was made conservator of MSS. in the Royal Library in Paris, later (1848) being appointed librarian to Napoleon III.

**Chance.** See **Probability**.

**Chancel**, that portion of a church in which the altar stands, and which is devoted to the use of the clergy, so called because separated from the rest of the church by a screen or rail (Lat., *cancellus*, 'screen'). In English usage the term is practically synonymous with choir.

**Chancellor.** The primary meaning is one who is stationed at the lattice-work (*cancellus*) of a window or a doorway to introduce visitors and others. The *cancellarius* under the later emperors was a chief scribe or secretary, ultimately invested with judicial powers. Most of the chief countries of Europe have had high officers of state with this title. (1.) The Lord High Chancellor of Great Britain is the chief lay officer of the crown, and takes precedence after the Archbishop of Canterbury. He is a member of the Cabinet, and retires on a change of ministry. (2.) The Chancellor of a Cathedral, is one of the higher clergy attached to some of the elder cathedrals in England, who has the custody of the seal of the dean and chapter, and exercises oversight in educational matters. The judge of the consistory court of a diocese is called the Chancellor of the Diocese. Usually he is a member of the bar, but sometimes the office is held by a clergyman. The appointment to the office lies with the bishop. See also EXCHEQUER; LANCASTER, DUCHY OF; UNIVERSITY.

**Chancellor, Richard** (D. 1556), English navigator, was appointed pilot-general in 1533 to Sir Hugh Willoughby's expedition in search of a northeast passage to India. The result was the establishment of the Muscovy Trading Company. A second voyage to the White Sea in 1555 ended in Chancellor's shipwreck and death off Pitslgo, on the coast of Aberdeen. See Hakluyt's *Navigations*, vol. i. (1589).

**Chancellorsville, Battle of**, a battle of the American Civil War, fought on May 2-4, 1863, at Chancellorsville, Va. (about 55 m.

n. by w. of Richmond), between the Federal Army of the Potomac, numbering about 130,000, under Gen. Hooker, and the Confederate Army of Northern Virginia, numbering about 60,000 under Gen. Lee, Hooker being outgeneralled and badly defeated. Hooker, though greatly superior in numbers, failed, through bad generalship, to bring all his troops into action, and, according to General Dodge, Lee, outnumbered him wherever he encountered him. The total Federal loss in the Chancellorsville campaign was about 17,200; that of the Confederates about 12,400. Consult Johnson and Buel's *Battles and Leaders of the Civil War*.

**Chancre** (Fr.), the sore which arises at the point of inoculation with syphilitic virus. See SYPHILIS.

**Chanda**, town, India, in Central Provinces; 85 miles south of Nagpur. It has interesting archæological remains and a collection of ancient statuary known as Rayappa's idols; p. 22,981.

**Chandarnagar, or Chandernagore** (correctly *Chandannagar*, 'city of sandalwood,' or perhaps 'moon city'), city, French Indo-China, on the right bank of the Hugli; 20 miles north of Calcutta. It was settled by the French in 1613; was taken by the British in 1757 and 1794; and finally restored to France in 1816; p. 26,941.

**Chandeleur Islands**, a group of about 15 small islands in the Gulf of Mexico, separated from the east coast of Louisiana by Chandeleur Sound. There is a lighthouse on the most northerly island.

**Chandler, Charles Frederick** (1836-1925), American chemist, was born in Lancaster, Mass. He helped to establish the Columbia School of Mines, in which he was professor of analytical and applied chemistry until 1877, and subsequently professor of chemistry in both the scientific and arts departments. He served as chemist and president of the Metropolitan Board of Health of New York City (1865-84), and during his incumbency effected many reforms in the sanitary arrangements of the city's food supplies in tenement-house management.

**Chandler, Seth Carlo** (1846-1913), American astronomer, was born in Boston, Mass. He gave his principal attention to the observation of variable stars, of which he prepared the standard catalog. He edited the *Astronomical Journal* from 1896 until his death.

**Chandler, William Eaton** (1835-1917), American public official, was born in Con-

cord, N. H. He was Secretary of the Navy, under President Arthur (1882-5), and during his régime the building of the modern navy was commenced. He was U. S. Senator from New Hampshire from 1887 to 1901, and in the latter year became president of the Spanish Treaty Claims Commission.

**Chandler, Zachariah** (1813-79), American statesman, was born in Bedford, N. H. He was elected mayor of Detroit in 1851 as a Whig, and took an active share in the organization of the Republican party, by which, in 1857, he was elected to the U. S. Senate, serving in that body until his appointment (1875) by President Grant as Secretary of the Interior.

**Chandos**, an English family of Norman descent, extinct in direct male line in 1428; but in 1554 Sir John Brydges, a descendant in the female line, was created Baron Chandos.

**Chandragupta**, or **Sandrocottus** (of Megasthenes), first emperor of India of the Maurya dynasty, reigning from 316 to 292 B.C. After the death of Alexander the Great (323 B.C.) he made an alliance with his most powerful western neighbor, Seleucus Nicator, king of Syria. His empire extended from the Hindu-Kush to the Bay of Bengal.

**Chang**, province, Tibet, lying immediately west of U or Us, the province in which Lhasa is situated. It is traversed by the Sanpo or Brahmaputra, and its largest town in Shigatse.

**Changarnier, Nicholas Anne Théodule** (1793-1877), French general, was born in Autun. He entered the army, served in the Spanish war (1823), and in 1848-9 was governor-general in Algeria. In the Franco-German war he was with Bazaine at Metz, and at the fall of the town was sent a prisoner to Germany, but returned to France in 1871.

**Chang-chia-ku**. See **Kalgan**.

**Changeling**, in fairy lore an elf infant substituted for a human infant shortly after birth, and soon developing a repulsive appearance and peevish temper.

**Chang-pai-shan, Lao-Ling**, or **Shan-aling Mountains**, mountain range, Manchuria, China, between Kirin and Korea, altitude 8,000 feet.

**Chang-sha-fu**, city, China, capital of the province of Hunan, on the Siang River; Chang-sha-fu is the seat of Yolo University, more than 700 years old, and of 'Yale-in-China,' an American institution for Chinese students; p. about 607,000. Repeated efforts of the Japanese to take the city failed.

**Chang-teh-fu**, city, China, in Hu-nan province, on the Yuan River, which forms the highway from the neighboring province of Kwei-chow to Hu-nan. It is an important trade centre; p. 662,655.

**Chang-Tso-lin**, (1876-1928), Chinese general, was born in Haichen Hsien, Fengtien. In 1911 he was appointed commander of the Fengtien Defence Force in China and after the establishment of the Republic became commander of the 27th division of the National Army. In 1918, he was made Inspector-General of the Three Eastern Provinces. In 1920 he was made Marshal and in 1921 High Commissioner for Mongolia, but being defeated by Feng Yuhsiang in an attempt to eliminate General Wu-Pei-fu, he was deprived of all his posts. Since that time he has ruled Manchuria as an independent province.

**Chang Yin Tang**, Chinese statesman, was born in Canton, the son of a noted general. He became vice-president of the Chinese foreign office, and in 1909 Chinese minister to Washington.

**Chanler, Amelie Rives**. See **Rives, Amelie**.

**Chanler, Lewis Stuyvesant** (1869-1943), American lawyer, was born in Newport, R. I., a great-grandson of William B. Astor. He was lieutenant-governor of New York in 1906-08, and unsuccessful candidate for governor (1908).

**Chanler, William Astor** (1867-1934), American public official, a descendant of the first John Jacob Astor, was born in Newport, R. I. He was graduated (1888) from Harvard and was a New York Member of Congress (1897-1901). He has made two expeditions to Africa. His published works include *Through Jungle and Desert*; *Travels in Eastern Africa* (1896).

**Channel Islands, The**, a group of small rocky islands of the northwestern coast of France, about 75 miles south of England. The group consists of Jersey and Guernsey, two or three smaller islands—Alderney, Sark, and Herm—and various tiny islets of rock or sea crags, as the Casquets, Jethou, Brechou, Dirouilles, Paternosters, Burhou, Minquiers, and Chausseys; total area about 75 square miles. The climate is mild, the annual mean temperature being 51.7° F., and there is much sunshine. Cattle raising is an important industry, the islands being famous for their individual breeds. Fisheries also are important, and fruit and flowers form a valuable export to England. The people are of Norman descent, industrious and

fairly prosperous. The language of everyday intercourse is the Norman-French patois; of the popular assemblies, law courts, and churches, modern French. English, however, is taught in the schools. The islands enjoy practically home rule. Jersey is administered by a lieutenant-governor appointed by the Crown, and Guernsey, Alderney and Sark are under one lieutenant-governor. The entire group was granted to the dukes of Normandy in the first half of the 10th century, during which period the peculiar insular (Norman) customs of the islands be-

1924); *History of the United States* (in six vols., 1905-25.)

**Channing, William Ellery** (1780-1842), American author and clergyman, was born in Newport, R. I., and was graduated (1798) from Harvard, where he took high honors. He studied for the Congregational **ministry** in Newport and Cambridge, and became minister of the Federal Street Congregational church, Boston (1803), where he remained until his death. Channing was an eloquent, powerful preacher. His religious views gradually developed into something akin to

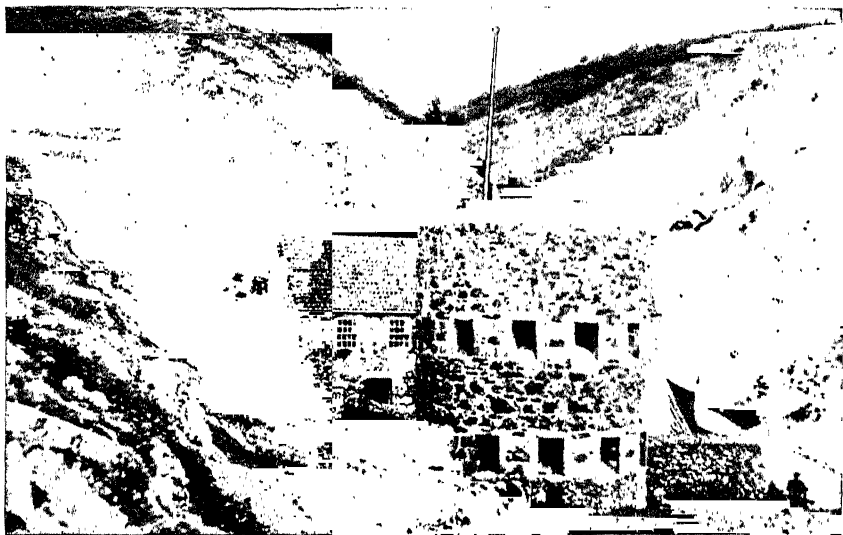


Photo by Photo Publishers Service, N. Y.

Old Tower on Coast of Guernsey, Channel Islands.

came established. Ever since the conquest of England the islands have loyally adhered to the English crown. Consult Wimbush and Carey's *The Channel Islands*; Foord's *The Channel Islands* (1924).

**Channing, Edward** (1856-1931), American historian and teacher, was born in Dorchester, Mass. He was graduated (1878) from Harvard where he became instructor in 1883, assistant professor (1887), and professor of history (1897-1913). His published works include *Town and County Government in the English Colonies of North America* (1884); *The United States, 1756-1865* (1896), in the Cambridge, England, Historical Series, which has been translated into Russian, German, Japanese, etc.; *A Student's History of the United States* (fifth rev. ed.,

those of modern Unitarianism. He was a powerful advocate of all social and humanitarian causes. Especially was he the friend of the poor and the slave, denouncing war and slavery in scathing terms. His most important works are: *Remarks on National Literature* (1823), *Negro Slavery* (1835), *Self-Culture and the Elevation of the Masses* (1838), and *Remarks on the Life and Character of Napoleon Bonaparte* (1840). His works were collected and published in 1841. Consult *Life of W. E. Channing*, by his nephew, W. H. Channing.

**Channing, William Henry** (1810-84), American clergyman, nephew of W. E. Channing, was born in Boston, Mass. He was pastor of Unitarian churches in Cincinnati and various eastern cities (1835-57), establishing

a reputation as a spiritual and eloquent pulpit orator, and as a forcible platform orator on public occasions. During this period he edited the *Memoir of William Ellery Channing* (1848). For two years he was chaplain of the U. S. Senate.

**Chansons de Gestes**, long narrative poems written by the old *trouvres* of Northern France, and dealing with subjects of French history. The word *gestes* comes from the Latin *res gestæ*, 'public acts,' and is applied indifferently to the deeds of a hero and to the poetical account of these deeds. The bulk of these divide themselves into three great cycles—that of Charlemagne, of Doon de Mayence, and of Garin de Montglane—together with some smaller cycles like that of Garin de Lorraine. The oldest of the chansons is that of *Roland*, about 1050. The popularity of the chansons was not limited to France; they spread into Provence, Italy, Spain, and even to Iceland.

**Chant**, the name given to the simplest and most ancient form of choral singing, for psalms, canticles, and litanies, still used in the Roman Catholic and Protestant Episcopal communions and sometimes in other churches. A chant is called 'single' when one verse is adapted to the tune, 'double' when two verses are required. The number of words given to the notes of the chant is termed 'pointing'; for this there are no set rules. See INTONING; PLAIN SONG.

**Chantarelle**, an edible mushroom (*Cantharellus cibarius*) usually found in hemlock woods. See MUSHROOMS.

**Chanter**. See BAGPIPE.

**Chantilly**, town, France, in the department of Oise; 26 m. north of Paris. Its chateau, built in 1527-37, restored in 1880, contains a valuable collection of works of art. Races are held three times during the year. During the Great War Chantilly was occupied for a few days by the Germans (Sept. 1914) and from October 1914 to December 1916 was French General Headquarters; p. 5,539.

**Chantrey**, Sir Francis Legatt (1781-1842), English sculptor was born in Norton, Derbyshire. His finest work is in portrait busts and in his representations of children, the most graceful among the latter being his well known *Sleeping Children* (Lichfield Cathedral) and the statue of *Lady Louisa Russel caressing a Dove*. Among his chief statues are *Washington* (State House, Boston, Mass.), *The Duke of Wellington* (in front of the London Exchange). Consult

Jones' *Sir Francis Chantrey*; Radcliffe's *Schools and Masters of Sculpture*.

**Chantry** (Fr. *chanter*, 'to sing'), the name given to a chapel or altar endowed for the purpose of having mass sung, generally for the repose of the soul of the founder; the term also applies to a bequest for endowing such chapel or altar.

**Chanzy**, Antoine Eugène Alfred (1823-83), French general, was born in Nouart, Ardennes. He was governor-general of Algeria (1873-79), ambassador to Russia (1879-81,) and was candidate for the presidency of the republic (1879.)

**Chaones**, a people who dwelt in Epirus, to the north of Greece; hence Epirus is sometimes called Chaonia.

**Chaos**, a term applied by the Greeks to the void and infinite space (the word means 'the yawning') which existed before the creation of the universe. Chaos was said to be the mother of Erebus (Darkness) and Nox (Night).

**Chapala, Lake**, the largest lake in Mexico, is situated on the boundary line between Jalisco and Michoacan. It is 70 miles long by 20 miles wide, with an area of 270 square miles. It lies more than 5,000 feet above sea level and its waters teem with fish.

**Chapbooks**, a term, apparently first used in the reign of George IV., denoting those small pamphlets or broadsides which at one time constituted the literature of the poor, not only in the British Isles, but throughout Europe. Their beginning in England is placed about the dawn of the 17th century. They were generally printed on inferior paper with poor type, and the price was small. The chief favorites were those of a humorous cast, among which the foremost is *The Merry Exploits of George Buchanan*. After 1800, chapbooks declined in popularity.

**Chapel**, a building used for divine worship. It may be entirely detached, in order to supply the needs of those in different parts of a parish, or it may form a separate apartment in a church, school, palace or private house. In the Middle Ages nearly all castles and many homes of the gentry had their own chapels and at the present time most colleges and universities, as well as many hospitals and private schools are equipped with chapels. In England the houses of worship used by the dissenters were known as chapels in distinction to the buildings of the Established Church. Saint-Chapelle in Paris is one of the most beauti-

ful chapels in existence. The 'Lady Chapel,' dedicated to the Virgin Mary, is usually directly back of the high altar in Roman Catholic churches.

**Chapelain, Jean** (1595-1674), French literary critic, was born in Paris. He was long looked upon as '*le prince des poètes français*,' but his reputation gradually declined. None the less, under Richelieu's patronage, he played a great part in the founding of the Academy.

**Chapelle, Placide Louis** (1842-1905), American Roman Catholic prelate, was born in the diocese of Mende, France, and went to the United States in 1859. He became archbishop of New Orleans and in 1898 he was appointed apostolic delegate to Cuba and Porto Rico, and commissioned to attend the peace negotiations in Paris. These duties he performed with great discretion, and in 1899 he was appointed apostolic delegate to the Philippines.

**Chapel Royal**, a chapel connected with a court. The Chapel Royal of England is known to have existed in the reign of Edward IV. It comprises a dean, sub-dean, royal chaplains, priests, a lay choir, several clerks, and an organist. Its purpose in early days was attendance on the sovereign wherever he might be; formerly it held worship in the chapel at Whitehall, but now only at St. James' Palace, London.

**Chapin, Edwin Hubbell** (1814-80), American clergyman, was born in Union Village, Washington co., N. Y. In 1837 he was ordained as a Universalist minister, and was pastor of churches at Richmond, Va., and Boston, Mass., until his acceptance, in 1848, of the pastorate of the Fourth Universalist Church of New York City. He became editor of the *Christian Leader* in 1872.

**Chaplains**, military clergymen, having the rank of noncombatant officers, and made a part of almost all modern military and naval establishments, in many of which attendance on the religious services conducted by them is obligatory on all officers and men. The National Defence Act, as amended by Act of Congress, approved June 4, 1920, provides for the original appointment of chaplains in the Regular Army as follows: Appointments as chaplains shall be made from among persons duly accredited by some religious denomination or organization, and of good standing therein, between the ages of twenty-three and forty-five years. Chaplains shall hereafter have rank, pay, and allowances according to length of active com-

missioned service in the Army, or, since April 6, 1917, in the National Guard while in active service under a call by the President, as follows: Less than five years, first lieutenant; five to fourteen years, captain; fourteen to twenty years, major; over twenty years, lieutenant colonel.

There were chaplains on some vessels of the U. S. Navy during the Revolution, but exactly when the first chaplains were appointed is difficult to determine, though it is likely that this occurred in 1777. Their duties are practically identical with those of chaplains in the army.

**Chapleau, Sir Joseph Adolphe** (1840-98), Canadian public man, was born in Sainte Thérèse de Blainville, Quebec. He was Conservative premier of Quebec from 1879 to 1882, resigning to accept the position of secretary of state in the Dominion Government. In 1892 he was made minister of customs and the next year lieutenant governor of Quebec, holding the position until 1897.

**Chaplin, Charles** (1825-91), French painter, was born in Andelys, France, of English parents. He studied at the Ecole des Beaux-Arts and found his true vocation as a portrait painter of women, in the *genre* of Watteau and Bouchers. Among his works are *Les builes de Savon* (1864), and *Souvenirs* (1882), his most popular canvas.

**Chaplin, Charles Spencer** (1889- ), English motion picture actor, was born in London, where he spent his youth. His parents were theatrical people. In 1910 he went to the United States as a leading comedian. In 1913 he made his first moving picture in Hollywood, Cal. in which he at once attained extraordinary success. He formed his own producing company in 1918 and since that time has continued to be regarded as one of the leading artists in the field of screen comedy. Among his best pictures are *A Dog's Life*, *Shoulder Arms*, *The Gold Rush*, *The Circus*, *City Lights*, and *The Dictator*.

In 1936, Mr. Chaplin produced and acted in the great cinema hit, *Modern Times*, and in 1940 in *The Dictator*, acting the part of Hitler. In 1943 he married Oona O'Neill, the daughter of Eugene O'Neill, the American playwright.

**Chapman**, a petty trader, usually itinerant. The 18th century travelling chapman sold chapbooks, needles, laces, linen, and other household requisites, and bought old brass, and old clothes.

**Chapman, Frank Michler** (1864-1945), American ornithologist, was born in Engle-

wood, N. J. He visited Florida for purposes of observation and collection, and in 1887-1908 was assistant curator, and since 1908, curator of the Department of Ornithology in the American Museum of Natural History in New York, for which institution he has done much collecting in Canada, Mexico, the West Indies and South America. Dr. Chapman was associate editor of *The Auk*, and established *Bird*



Charles Chaplin.

*Lore*, a bi-monthly magazine, in 1899, and has received many scientific honors. He is the originator of the Habitat Group so widely used in museum exhibits. His popular publications (accurate and readable treatments) include *Handbook of Birds of Eastern North America* (1895); *Bird Life* (1897); *What Bird Is That?* (1920); and he has also published various scientific and technical volumes.

**Chapman, George** (1559-1634), English dramatic poet of the second period of the Elizabethan era, was born near Hitchin, Hertfordshire. His plays include *Bussy d'Ambois*, the one play that survived the Restoration, and the *Admiral of France*, both French tragedies. But it is as a translator that Chapman is preëminent. His work includes translations of the *Iliad*, the *Hymns*, and the *Odyssey*, which were celebrated by Keats's noble sonnet 'On First Looking Into Chapman's Homer'.

**Chapman, John** (1810-54), English political writer, was born in Loughborough, Leicestershire. He became editor of the *Mechan-*

*ics' Magazine*, and invented improvements on the 'four-wheeler' which led to the 'hansom cab' (patented 1836). He wrote *The Cotton and Commerce of India* (1851).

**Chapman, J. Wilbur** (1859-1918), American clergyman and evangelist, was born in Richmond, Ind. He was executive secretary of the Presbyterian General Assembly's committee on evangelistic work, in which position he was very successful. He is the author of several books on evangelistic subjects.

**Chapman, Maria** (1806-85), American reformer, was born (Weston) in Weymouth, Mass. She devoted herself to the abolitionist cause, and for many years was treasurer of the Massachusetts Anti-slavery Society. She published an anti-slavery annual, *The Liberty Bell*, and edited the *Autobiography* (1877) of her friend Harriet Martineau.

**Chapone, Hester, née Mulso** (1727-1801), English essayist, was born in Twywell, Northamptonshire. Her *Letters on the Improvement of the Mind* (1772) had great vogue in female educational circles and went through many editions.

**Chapped Hands**, a form of eczema due to exposure to extreme cold.

**Chapra**, town, Bengal, India, in Saran district, 32 m. n.w. of Patna; p. 45,000.

**Chaptal, Jean Antoine, Comte de Chanteloup** (1756-1832), French chemist and statesman, was born in Nogaret, Lozère. He was a member of the Institute (1798); and Minister of the Interior (1800-4), when he founded the French Chamber of Commerce, created the first industrial school, and began the canalization of the rivers of France.

**Chapter**, a regular assembly of monks or canons; in modern usage the body of ecclesiastics connected with a cathedral or collegiate church, and presided over by the dean. The members are obliged to spend a certain fixed time in residence, during which they conduct the daily cathedral services, and act as an advising council to the bishop. See CANON; DEAN.

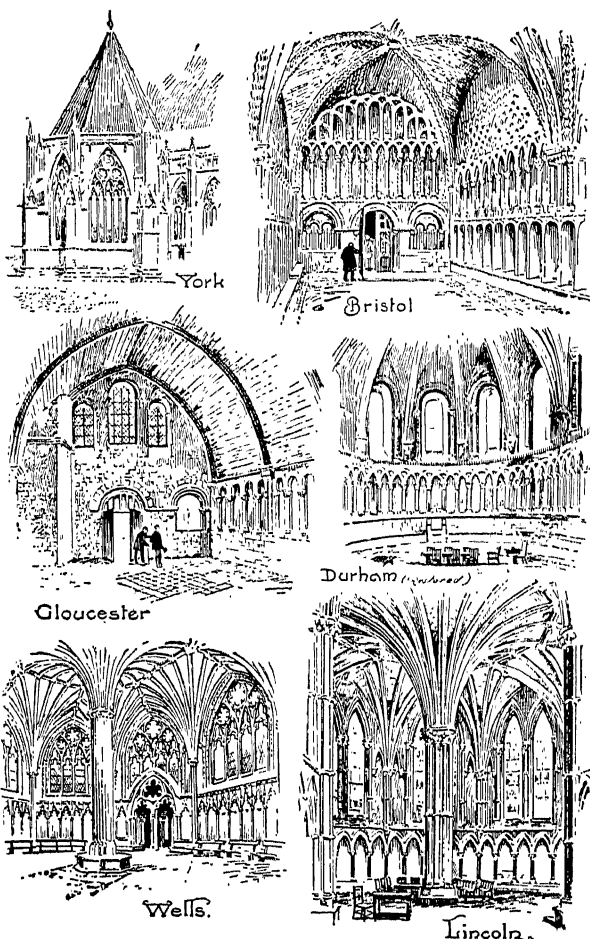
**Chapter-house**, one of the monastic buildings appended to a cathedral, abbey, or collegiate church. It is usually a lofty, vaulted apartment situated contiguous to the cathedral. Its ordinary form is either polygonal or octagonal. In the case of the Benedictine churches it is square. In many instances the interior is richly carved and decorated, and a central shaft supports the ceiling.

**Chapu, Henri** (1833-91), French sculptor, was born in Mée (Seine-et-Marne). The most typical examples of his work are the patheti-

cally beautiful *Princess Hélène at the Tomb of the Duc d'Orléans*, at Dreux; and *Youth*, the memorial to Henri Regnault.

**Chapultepec**, an isolated hill, or large rocky mass, rising about 150 ft. above the surrounding country, between two and three m. s.w. of the City of Mexico. It was occu-

chiefs were carved on its base. In 1785 Don Bernardo de Galvez, then Spanish Viceroy of Mexico, completed a magnificent palace on Chapultepec, and since about 1887, remodelled and to some extent rebuilt, it has been the summer residence of the President of Mexico. The lower terrace of the palace has,



*Typical English Chapter Houses.*

ped by the Aztecs (probably about 1245 or about three-quarters of a century before the founding of the City of Mexico) and subsequently, according to tradition, was used as a summer residence of the chiefs. It was certainly used to some extent as a burial place, and the effigies of a number of the Aztec

since before the Mexican War, been occupied by a military school, now the National Military College, the West Point of Mexico. During the Mexican War, the hill, regarded as the key to the City of Mexico, was stormed and captured, Sept. 13, 1847.

**Chara**, brittle green submerged plants.



with branched shoots about a foot long, bearing at intervals whorls of apparent leaves, which are sometimes found rooted in the mud of stagnant ponds or nearly stagnant streams. They belong to the family of plants known as Characeæ.

**Charade**, a kind of riddle the answer to which is one word. A popular form of amusement is to act out charades. A short dramatic sketch in three or more acts is organized, having a certain dramatic unity running through it. Each of the earlier scenes represents one syllable or more of the whole word, which is itself prominently presented in the final scene.

**Charbon**. See **Anthrax**.

**Charcoal**, a form of amorphous carbon obtained by thoroughly heating wood. If required for fuel, it is best prepared by the partial combustion of wood in heaps; but for an ingredient of gunpowder, the wood is charred in externally-heated cylinders. Charcoal is a porous solid, resembling the wood it was obtained from, and is usually black. The

*Pas*, was shipwrecked off the coast of Iceland, and he perished with nearly every one on board.

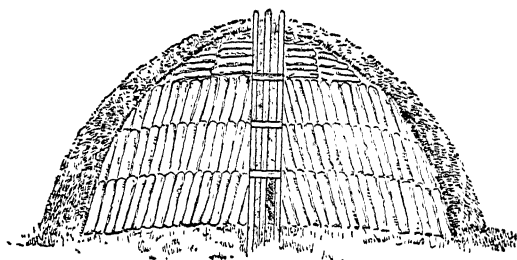
**Charcot, Jean Martin** (1825-93), French physician, was born in Paris. His name has been given to several symptoms in nervous maladies.

**Chard**, **Swiss Chard**, or **Sea Kale**, a variety of leaf-beet grown especially for its stalks and leaves, which are prepared as greens. It is also used as a salad.

**Chardin, Sir John** (1643-1713), French traveller. He made two expeditions as a gem-dealer to Persia (1666 and 1670-7).

**Charente**, river, France, rising in the department of Haute Vienne. It flows in a generally westward direction for about 225 m. through the departments of Charente and Charente-Inférieure, entering the Atlantic between the islands Ré and Oléron. It is navigable from Angoulême to the sea.

**Charente**, department, France, in the basin of the Charente; area 2,305 sq. m. It consists



Section of Charcoal Kiln, showing the arrangement of Wood.

main uses of charcoal are as a fuel, in the manufacture of gunpowder, as a deodorant, for crayons, and, on account of its poor conductivity, for surrounding cold-storage chambers. Bone or animal charcoal is obtained by charring bones. See **CARBON**.

**Charcot, Jean Baptiste Etienne** (1867-1936), French explorer, was born in Paris. In 1908-10 he conducted scientific expeditions to the Antarctic regions, of which he published accounts.

During the Great War, Dr. Charcot (he was a doctor of medicine and had practiced that profession for more than ten years before embarking on his career as an explorer) won the Croix de Guerre and Britain's 'D.S.C.' After the war he continued to make many trips to the Polar regions and made many valuable scientific discoveries. In September, 1935, he started back from Greenland, but his famous ship, the *Pourquoi*

mainly of gently undulating plateaus. In the extreme s. the beautiful Dronne forms the boundary for 20 m. Angoulême is the capital; p. 316,279.

**Charente - Inférieure**, dep., France, bounded on the w. for 44 m. by the Atlantic Ocean, and on the s. w. for some 30 m. by the right bank of the Gironde estuary. The department, which includes the islands of Ré and Oléron, is irregular in shape, and has an area of 2,791 sq. m.; p. 418,310.

**Charenton-le-Pont**, town, France, a suburb of Paris, on the Seine at its junction with the Marne; 3 m. s.e. of Notre Dame cathedral. The river is here crossed by a fortified bridge; p. 20,872.

**Chares**, Athenian general, whose chief exploits were the relief of the Philasians in 367 B.C., and the capture of Sestos in 353.

**Chares** (c. 300 B.C.), of Lindus in Rhodes, a famous Rhodian sculptor, the favorite pu-

pil of Lysippus. His most famous work was the Colossus of Rhodes.

**Charette de la Contrie, François Athanase** (1763-96), French Royalist, chief of the Vendean revolt against the French Revolution. After the defeat at Quiberon (June 27, 1795), he was vigorously pursued by Hoche, who, after repeatedly defeating him, at length captured and executed him (Mar. 26, 1796).

**Chargé d'Affaires**, a subordinate diplomatic agent accredited to an embassy in a foreign land, and either in charge during the temporary absence of an ambassador, or representing his country at one of the less important courts. See DIPLOMATIC SERVICE.

**Charing Cross**, district of London, England, which derives its name from the cross of stone which was there erected 1291-4, to Eleanor, queen of Edward I.

**Charitable Trusts or Charities**, institutions or funds dedicated by private individuals to the relief and benefit of the poor.

**Charities**, (Lat. *Gratiæ*), in Greek mythology, the Graces or goddesses who personified graces and beauty. They were three in number, the daughters of Zeus, and were named Euphrosyne (Joyfulness), Aglaia (Brilliance), and Thalia (Luxury).

**Chariton**, city, Iowa, county seat of Lucas co. Its manufactures include tanks; P. 5,754.

**Charity**, in its restricted sense the relief of the poor and suffering. There is general agreement regarding certain principles of relieving poverty. It should aim at prevention, and at the removing of causes rather than at the remedying of effects. It should be given only after inquiry. Poverty may be deserved or undeserved, and relief must be governed accordingly. Consult C. R. Henderson's *Modern Methods of Charity*.

**Charity Organization Societies**, voluntary associations composed of persons engaged in the administration of the charities of a city. The purpose of a charity organization society is, first, to coördinate the charitable activities of a city so as to avoid duplication of work, and to prevent pretended unfortunates from imposing upon the several charitable institutions; and secondly, through comparison of methods and results, to secure a more scientific administration of relief. Consult Warner's *American Charities* (1919); Watson's *The Charity Organization Movement in the United States* (1922).

**Charivari**, a French term for an uproar made by the clanging of pans and kettles, hissing, groaning, and howling, against per-

sons in disfavor. In mediæval France it was specially indulged in at the weddings of widowers or widows. 'Chevaree,' 'shivaree,' and 'skimmerton' occur in America, 'shivoo' in Australia. In America it usually signifies a rowdy serenade to newlyweds by their friends.

**Charlatan**, during the Middle Ages a special division of the jongleurs. In English, the word became peculiarly associated with the itinerant quack-salver, or vender of 'cure-all' medicines, and hence it is now understood to signify any quack, or boastful pretender to a knowledge or skill which he does not possess.

**Charlemagne**, or **Charles the Great** (742-814), grandson of Charles Martel, was probably brought up at the court of his father, Pepin the Short, and on his death became king of the Franks, 768, at first jointly with his brother Carloman. After the latter's death, 771, he ruled alone. His long reign of forty-six years was occupied in waging war against every race that seemed to threaten the empire. His forces were so overwhelming and so well organized, and his military and political genius so great, that the enemy rarely faced him. Charles crossed the Alps, and was soon master of Italy, the greater part of which he added to his Frankish empire; and in 776, after an unsuccessful revolt by the Lombards, he created Italy a kingdom, which he conferred on his son Pepin in 781, who was crowned king of Italy by the Pope. Meantime Charles had his attention directed to Spain by the troubles among the Saracens, and in 778 he invaded the peninsula with two armies. In 800, on the invitation of Pope Leo III., Charles proceeded to Italy, and on Christmas Eve was crowned emperor of the Romans; and the foundation of the political system of the Middle Ages was laid. The remaining years of his reign were comparatively quiet. He died in 814 at Aix-la-Chapelle, where he was buried. Consult 'Life' by Eginhard in Latin, in *Bibliotheca Rerum Germanicarum* (1873; Eng. trans. by Glaister, 1877); Mombert's *Charles the Great*; Mullinger's *The Schools of Charles the Great*; Wells' *The Age of Charlemagne*; Davis' *Charlemagne*, in *Heroes of the Nation* series. For his governmental institutions, consult Fustel de Coulanges's '*Le gouvernement de Charlemagne*,' in *Revue des Deux Mondes*; for the literature of the period, Ampère's *Histoire littéraire de la France sous Charlemagne* (2nd ed., 1868); for arts, Schnaase's *Geschichte der bildenden Künste*, vol. IV. (8

vols.); and for romance, Gaston Paris' *Histoire poétique de Charlemagne*.

**Charleroi**, town, Belgium. It is one of the centres of the coal and iron industries of Belgium. In the 17th and 18th centuries it was frequently besieged and passed alternately into the hand of the Spaniards, the French, and the Austrians. In the Great War it was the scene of fierce fighting and several times changed hands, being eventually occupied by the German forces until after the armistice; p. 27,394.

**Charles, Cape**, the southern extremity of Smith Island, at the northern entrance to Chesapeake Bay.

**Charles I.**, emperor. See **Charlemagne**.

**Charles II.** See **Charles II.**, the Bald, of France.

**Charles III., The Fat** (839-888), emperor of the Romans. By the death of his brother Carloman (880) he gained Carloman's dominions and Italy; and in 882, by the death of his other brother Louis, he came into possession of the rest of Germany. In 884 he was also offered the crown of France, so that the whole of the empire of Charlemagne was again in one hand. But Charles was not equal to the task put upon him. The nobles, dissatisfied with his weak reign, deposed him at Tribur (887). Thereupon he retired to Swabia, where he died the following year.

**Charles IV.** (1316-78), emperor of the Romans, was born at Prague the son of John, king of Bohemia; was elected emperor (in opposition to Louis of Bavaria, died 1349) in 1346, as well as king of Italy at Milan in 1355. In his hereditary dominions he ruled with exemplary wisdom, founding at Prague in 1348 the first of the German universities.

**Charles V.** (1500-58), emperor of Germany, son of Philip, archduke of Austria, and of Joanna, daughter of Ferdinand and Isabella of Spain, became in 1516, by right of birth, ruler of Spain, the Netherlands, Sicily, Naples, and the New World; and on the death of his grandfather, in 1519, added Austria to his dominions. His grandfather, Maximilian, had endeavored to secure for him also the succession to the imperial throne; but the electors at first rather favored the claims of the rival candidate, Francis I. of France. By dexterous policy, however, the honor was secured for the young Charles, and thus began that rivalry between Charles and Francis which is one of the determining factors of European history. The war was waged in all quarters, but in Italy alone was it decisive;

and the French were driven from the Duchy of Milan in 1521, and out of Italy altogether in 1522. Francis again invaded Italy and occupied Milan; but he was defeated and made captive at Pavia, and forced to sign the treaty of Madrid, by which he resigned all his pretensions. But the terms were too humiliating, and war again broke out, which did not end till a joint invasion of France by Henry VIII. of England and Charles forced Francis to sign a most unfavorable peace at Crespy in 1544. The chief interest of the remaining years of his reign lies in his German dominions. He wished to secure the reversion of the imperial throne for his son Philip; but in this he was disappointed, through the insistence of his brother, Ferdinand of Austria, who claimed the empire for himself. The other and more important object was to stamp out heresy, and restore Germany unbroken to the papacy. Charles had issued an edict against Luther but was met by the formation of the Schmalkaldic league of Protestant princes. He was forced to agree to the peace of Augsburg in 1555, which acknowledged the existing conditions, and permanently established Protestantism over a great part of Germany. In 1556, disappointed in his ambitions and broken in health, he abdicated in favor of his son Philip, and retired to the monastery of San Yuste. See Robertson's *Life of Charles V.*

**Charles VI.** (1683-1740), emperor, son of the Emperor Leopold I. His candidature in 1700 for the Spanish throne led to the war of the Spanish Succession. By the treaties of Utrecht and Rastadt Charles VI. added to his dominions the Spanish Netherlands, Milan, Naples, and Sardinia, exchanged later for Sicily; and he acquired Serbia and Wallachia. Most of the Italian territories were, however, lost during the war of the Polish Succession, and Serbia and Wallachia had likewise to be yielded, after an unsuccessful Turkish campaign. The ruling object of Charles's policy was to secure the succession (Pragmatic Sanction of 1713) of his daughter, Maria Theresa, in preference to the daughters of his brother Leopold.

**Charles VII.** (1697-1745), emperor, was the eldest son of the Bavarian elector Maximilian Emmanuel, and succeeded to the electorate in 1726. Having married a daughter of the Emperor Joseph I., he refused to acknowledge the Pragmatic Sanction of Charles VI., and joined the coalition against Maria Theresa. In 1742 he was made emperor but the tide turned, and until his death, in 1745,



*'Speaker Lenthall Refusing the Demand of Charles I for the Surrender of the Five Members.'*  
*From the Fresco in the House of Commons.*

he was a fugitive from his own dominions. See *Tagebuch Kaiser Karls VII.*

**Charles I.** (1600-49), king of Great Britain and Ireland, in 1623 proceeded in company with Buckingham to the Spanish court, Madrid, to win the hand of the Spanish Infanta. The English people, however, hailed with joy the rupture with Spain which ensued upon Charles's pique at his failure. But he immediately dashed his people's Protestant hopes by marrying the French (Roman Catholic) princess Henrietta Maria by proxy. Succeeding his father in 1625, he was soon involved in controversy with Parliament, particularly regarding the revenues rendered necessary by the extravagant policy of Buckingham; after Buckingham's assassination (1628) he yielded his will to Queen Henrietta, whose influence over him was unbounded, and in the end fatal. In 1626, by the aid of loans and pawning the crown jewels, he fitted out two expeditions against Cadiz, which ended in failure. Charles was not by nature a tyrant, perhaps not even a bigot; but the force of his two chief advisers—Laud (made archbishop of Canterbury, 1633) and Strafford drove him not only into violating the liberties which Englishmen held dear, but into irritating the conscience of England by carrying out Laud's High Church ideas. He levied and raised money by granting monopolies and demanding ship money from the seaports (1634). In 1639 Laud drove the Scots to rebellion by his attempts to force a liturgy on them. These two events induced Charles to summon Parliament, of which two—the 'Short Parliament' (of three weeks' duration) and the 'Long Parliament'—met in 1640. The Long Parliament impeached Strafford and forced Charles to assent to a bill enacting that Parliament could not be dissolved save with its own consent. Thus began the long struggle between Charles and Parliament; and the Long Parliament outlasted him. Charles hoped to win the Scots to his side. His return to London was marked by the Grand Remonstrance. The royal standard was raised at Nottingham, and civil war broke out. It ended with the disastrous battle of Naseby (1645). He surrendered himself to the Scots at Newark in 1646, who gave him up to the English; the story of his execution at Whitehall has a dignity which in part redeems his character. He was a pattern of the domestic virtues, but he was both too obstinate and too weak to cope with the remendous issues he raised.

**Charles II.** (1630-85), king of Great Brit-

ain and Ireland, had none of his father's virtues, and his vices were all his own. But Charles showed a gay bonhomie which kept him popular. Born at St. James's, London, Charles was present at Edgehill in 1642, but otherwise played no part in the civil war till after the death of his father. He was sent abroad, and did not return till 1650. He was



*Charles II.*

crowned at Scone, Jan. 1, 1651, and in the following August, at the head of an army of 10,000 men, he invaded England, only to be utterly routed by Cromwell at Worcester. After a series of romantic adventures he escaped to France. He was recalled to the throne of his father, landing at Dover May 26, 1660. During the first six or seven years his faithful minister Clarendon kept him true in the main to a national policy, although as early as 1661 he was in receipt of a subsidy from the French king, and in 1662 sold Dunkirk to the French. In the latter year he married Catherine of Braganza, pledging himself to support Portugal against Spain. The war with Holland was on the whole popular, because Holland was the object of intense commercial jealousy. But in spite of two English victories, the Dutch burned the shipping in the Medway, forcing Charles to conclude the peace of Breda (1667). This was advantageous only to France. Charles made the secret treaty of Dover with Louis in 1670, and became an open ally of France. But there was a strong anti-French as well as anti-papal feeling in England, and Charles

had to make his peace with Holland in 1674, and allow his niece, Princess Mary, to marry William, Prince of Orange, in 1677.

In domestic politics, Charles's reign is marked by a strife between the court and the country party, and by a growing desire on the part of the king to favor the Roman Catholic religion.

**Charles I.** of France. See **Charlemagne**.

**Charles II., The Bald** (823-877), King of France (as Charles I.), and Emperor of the Romans, son of Louis le Débonnaire and grandson of Charlemagne. On the partition of the Empire in 837, Charles received the western part between the Weser and the Loire. His reign was characterized by frequent incursions of the Normans, by the growth of feudalism in France, and by the influence gained by the clergy, whom Charles protected, and upon whose power he afterward relied. In 875 he was crowned by the pope Emperor of the Romans. He died from fever near Mont Cenis, when going to help the pope against the Saracens.

**Charles III., The Simple** (879-929), King of France, posthumous son of Louis II. When his brother Carloman died Charles was too young to reign, and Eudes or Odo, Count of Paris, usurped the French crown. But Charles was nevertheless crowned at Rheims in 893, and after the death of Eudes became actual king over the whole of France. The most important event of his reign is the peace he concluded with the Normans in 911, by which he ceded to their chief the lower valley of the Seine—i.e. Normandy—as a hereditary dukedom.

**Charles IV., The Fair** (1294-1328), King of France, the third son of Philip the Fair, ascended in 1322 the French throne, after the death of his brother, Philip V. With him the direct line of the Capets became extinct.

**Charles V.** (1337-80), surnamed **The Wise**, King of France, son of John the Good. Succeeding his father in 1364, he cleared the country of numerous bands of mercenaries by dispatching them under Du Guesclin against the English in Spain, employed the same able captain in the successful expulsion of the English from France, except at Calais, Bordeaux, Bayonne, and Cherbourg, and effectually curbed the power of the feudal nobility. Besides this, he established the administration of justice, and laid the foundations of the National Library by collecting mss. in the Louvre. See Benoist's *La Politique du Roi Charles V.* (1886).

**Charles VI.** (1367-1422), King of France,

son of the foregoing, succeeded to the throne at the age of twelve; and the Government was entrusted to the Dukes of Berri, Burgundy, and Bourbon, who governed so badly that the people of Flanders and the North of France rose in revolt. The country was distracted by civil war between the Armagnacs and the Burgundians, and thus was unequal to battles with the English at Agincourt and elsewhere. Charles had to submit to the humiliating treaty of Troyes by which Henry V. was acknowledged as heir to the French throne. See Duval-Pineux's *Histoire de France sous le Règne de Charles VI.* (2 vols. 1842); and books cited at HENRY V.

**Charles VII.** (1403-61), called **The Victorious**, King of France, crowned in 1422, after the death of his father, Charles VI., in spite of the treaty of Troyes. Charles made little headway against the English till the advent in 1429, of Joan of Arc, the Maid of Orleans. With their disastrous defeat at the siege of Castillon in 1453, the end of the Hundred Years' War may be said to have come, and England retained Calais only of her French possessions. A great stain on Charles's fame was his cowardly surrender of Joan of Arc to the English. See Du Fresne de Beaucourt's *Histoire de Charles VII.*

**Charles VIII.** (1470-98), King of France succeeded in 1483 his father, Louis XI. For eight years his sister Anne practically ruled France with a strong hand, repelling foreign invaders, while giving peace and prosperity at home. Charles, however, chafed under her control, and dreamed of conquering Italy and of expelling the Turks from Europe; but when he invaded Italy in 1495 he so alienated the people by his imprudence and thoughtlessness that they threatened to cut off his retreat. However, he gained a decisive victory at Fornova (1495). By his marriage to the heiress of the Duke of Brittany he added Brittany to France. See Cherrier's *Histoire de Charles VIII.*

**Charles IX.** (1550-74), King of France, son of Henry II., and Catherine de' Medici, succeeded to the throne at the age of ten on the death of his brother, Francis II. His mother became regent, and consolidated her power during his reign; but when the Huguenots became too powerful she plotted with the Guises, and tricked her son into giving consent to the infamous massacre of St. Bartholomew, on Aug. 24, 1572. Charles was seized with remorse, and died at Vincennes. See De la Bare-Duparcq's *Histoire de Charles IX.* (1875).

**Charles X.** (1757-1836), King of France, was born at Versailles. After the restoration of the French monarchy, the direction of affairs, owing to the weakness of his brother, Louis XVIII., was largely committed to his charge. After Louis's death in 1824 Charles ascended the throne, and called Prince Polignac to power. Polignac appealed to the traditional French love of glory, and organized the expedition against Algeria. But the French were not so dazzled by the military glories as to pardon the ordinances of July 25 suspending the liberty of the press and dissolving the chambers. Charles was compelled to abdicate, the crown being offered to Louis Philippe, who accepted it. Charles retired to England. See *Védrenne's Vie de Charles X.* (3 vols. 1879), and Lamartine's *Histoire de la Restauration*. (1852).

**Charles II.** (1661-1700), King of Spain, son of Philip IV.; succeeded to the throne in 1665, under the regency of his mother, Maria Anna of Austria. Weak bodily and mentally, he left the government of the country to various favorites, and during his reign Spain fell very low. Charles, having no heir, bequeathed the throne to Philip of Anjou, grandson of Louis XIV. of France; this subsequently gave rise to the War of the Spanish Succession. Charles was the last of the Hapsburgs to occupy the Spanish throne.

**Charles III.,** (1716-88), King of Spain, eldest son of Philip V. by his second marriage with Elizabeth Farnese. Through the energetic action of his mother he became in 1731 Duke of Parma. In 1738 he succeeded as King of Naples and Sicily and ruled the country wisely. On the death of his brother, Ferdinand VI. (1759), he became also King of Spain. He was an ally of France in the war with England, and by the treaty of Paris in 1763 surrendered Florida to England, receiving at the same time the cession of Louisiana from France. He also joined France in aiding the American colonies during the Revolutionary War, and when peace was concluded received Florida again. His internal policy was most beneficial to his country. He abolished certain clerical abuses, curtailed the power of the Inquisition, and expelled the Jesuits from Spain. Nearly all the great buildings of Madrid date from this time. Spanish literature also flourished in his reign. See William Coxe's *Memoirs of the Kings of Spain of the House of Bourbon*, 1700-88; Danvila y Colado's *Reinado de Carlos III.*

**Charles IV.** (1748-1819), King of Spain, son of Charles III.; born at Naples; succeeded

his father in 1788, and at first followed in his footsteps. Eventually, however, he entrusted the Government to Manuel de Godoy the favorite of his wife, and through him was led to declare war against France (1793), and finally to conclude with her (1797) an offensive and defensive alliance, which involved Spain in a war with England and Portugal. Spain lost several colonies, her maritime commerce was destroyed, and her fleet annihilated at Trafalgar (1805). After the revolt in favor of Charles's son, Ferdinand, Charles was persuaded by Napoleon to abdicate the throne of Spain in Napoleon's favor, May 6, 1808. He retired later to Rome, where he died. See Muriel's *Historia de Carlos IV.*

**Charles I.,** King of Portugal. See **Carlos.**

**Charles VII.,** King of Sweden, reigned from 1155 to 1167, succeeding his father, King Sverker. The first Six Swedish Charleses are an invention of the chronicler Johannes Magnus.

**Charles VIII.** (1409-70), King of Sweden of the Bonde family. On the death of Christopher, last representative of the united monarchy of Denmark and Sweden, Charles was elected King by the Swedes (1448), but in 1457 was driven from the throne by a conspiracy and in 1467 was acknowledged King once more, this time keeping the throne till his death. The whole of his reign was engaged in a continuous struggle against the Danish party in Sweden.

**Charles IX,** (1550-1611), King of Sweden, youngest and ablest son of Gustavus I. (Vasa). After the death of his brother John in 1592 he summoned the Synod of Upsala to complete the religious reformation begun by his father. It was his ambition to make Sweden the leading Protestant Power in Europe.

**Charles X.** (1622-60), King of Sweden, son of the Count Palatine, John Casimir of Zweibrücken, and Catherine, daughter of Charles IX., was born at Nyköping. On Christina resigning in his favor, he was crowned king at Upsala (1654). In the following year he conquered the whole of Poland. Meanwhile the Dutch, jealous of Charles's commanding position, incited Denmark also to declare war upon him. In 1658 Charles compelled Denmark to sign the humiliating Peace of Röskilde, whereby she surrendered to Sweden the provinces of Halland, Scania, Blekinge, Bohus, Bornholm, and the diocese of Trondhjem in Norway.

**Charles XI.** (1655-97), King of Sweden, only child of Charles X., succeeded his father

under a council of regency till he attained his majority at the age of seventeen. Misled by his counsellors, he embarked (1675) in a war with Brandenburg. Denmark and Holland at once declared war against Charles: a large Danish army invaded Sweden; but Sweden emerged from the war in 1679 with an almost inappreciable diminution of territory. Charles so lessened the influence of the nobles that he became practically absolute; at his death Sweden was stronger and richer than she had ever been before.

**Charles XII.** (1682-1718), King of Sweden, sole surviving son of Charles XI., whom he succeeded in 1697. In 1699, Russia, Denmark, and Saxony having formed a league against him, Charles compelled the Danes to make peace by The Treaty of Travendal, Aug., 1700. He then proceeded to invade Poland. He defeated the Poles in several battles. Thereafter, on Aug. 22, 1707, he set out with an army of 43,000 for the invasion of Russia. Want of food and supplies, and the persuasions of the rebel Cossack Hetman, Mazeppa, induced him to turn south-eastwards into the Ukraine. Charles laid siege to Poltava, but was defeated there by an overwhelming Russian army, and barely escaped with a few hundred horsemen into Turkey. But the Peace of the Pruth between Russia and Turkey put an end to all his hopes from the Sultan, who, indeed, seized the person of Charles, whom he imprisoned at Demotika. Ten months later Charles succeeded in escaping, and on Nov. 21, 1714, reached Stralsund. In 1718, invading Norway the second time, Charles was killed. See R. Nisbet Bain's *Charles XII.* (1895), and Voltaire's *Histoire de Charles XII.*

**Charles XIII** (1748-1818), King of Sweden and Norway, second son of Adolphus Frederick, became regent during the minority of his nephew, Gustavus IV. On June 20, 1809, he was elected king. In 1812, and again in 1813, he joined the Grand Alliance against France.

**Charles XIV.** (1764-1844), king of Sweden and Norway, originally JEAN BAPTISTE JULES BERNADOTTE, son of an advocate at Pau, France. He was war minister under the Directory, and was sent by Bonaparte to Vienna as French Ambassador. On Aug. 21, 1810, Bernadotte was elected crown prince of Sweden by the Riksdag, in the hope that this compliment to one of his marshals would induce Napoleon to help Sweden to recover Finland from Russia. In 1812 he joined Great Britain and Russia against France. On Jan. 34, 1814, he dictated to Denmark the Peace

of Kiel, and after vanquishing the Norwegians in a fortnight's campaign, was acknowledged as crown prince of Norway in 1814. Succeeding to both crowns on Feb. 5, 1818, he won respect by good and careful government. Consult Sarrans' *Histoire de Bernadotte*; *Correspondance de Bernadotte avec Napoléon.*

**Charles XV.** (1826-72), king of Sweden and Norway, son of Oscar I., ascended the throne July 8, 1859. His foreign policy was characterized by dislike of Prussia, and by friendliness toward France and Denmark.

**Charles I. of Anjou** (1226-85), youngest son of Louis VIII. of France, and brother of Louis IX., the Saint. His brother gave him Anjou and Maine, and in 1246 he became by marriage duke of Provence. In 1265 Pope Clement IV. offered him the crown of Naples and Sicily; his government provoked great discontent in both Naples and Sicily, and in 1268 he had to cope with a revolt under Conradin. After the death of Louis IX he became the most important sovereign in Western Christendom, being all-powerful in France, and exercising great influence over the rest of Italy. A league was formed against Charles by the pope. Peter of Aragon came to the help of the Sicilians. Charles's fleet was defeated by the Spanish fleet near Reggio in 1284, and the French lost Sicily forever.

**Charles I.** (1887-1922), emperor of Austria and king (Charles IV.) of Hungary, was born in Persenberg, eldest son of Archduke Otto, younger brother of Francis Ferdinand, whose own sons were excluded from the succession by an oath taken by their father at his marriage. In 1911 he was married to the Princess Zita of the Bourbon house of Parma. The proclamation of his accession as co-regent with Francis Joseph was set for Dec. 2, 1916; but by the death of the latter, Charles succeeded to the throne. After the Great War, on Nov. 11, 1918, Charles abdicated; and later was taken by a British warship, with his wife, to Madeira, where he lived for some years before his death.

**Charles I.** (1839-1914), king of Roumania, second son of Prince Charles Anthony of Hohenzollern-Sigmaringen, was elected prince of Roumania on April 20, 1866. The new prince was compelled to enter his principality disguised as a Russian merchant bound for Odessa. At the outbreak of the Russo-Turkish War, Prince Charles proclaimed himself independent—the country was until then under the suzerainty of the Porte. He concluded an alliance with Russia. The independence of



Roumania was confirmed in 1878, and on March 26, 1881. Prince Charles was proclaimed king. He married, on Nov. 15, 1869, Princess Elizabeth of Wied, better known under her literary name of Carmen Sylva. He died on Oct. 10, 1914, a few months after the outbreak of the Great War.

**Charles Albert** (1798-1849), king of Sardinia (1831-49), son of Charles Emmanuel, duke of Savoy-Cavignano, succeeded his brother, Charles Felix, in 1831. He was liberally inclined, and played a considerable part in the movement for a united Italy, but did not go far enough for the leaders of the popular party. Mazzini, in particular, distrusted his moderate and diplomatic policy. When Milan revolted against Austria, he hastened to the help of Lombardy and Venice, and declared war against Austria. Disastrously defeated near Novara in 1849, he resigned the throne in favor of his son, Victor Emmanuel.

**Charles Alexander, Duke of Lorraine** (1712-80), son of Duke Leopold, was born at Lunéville. In the War of the Austrian Succession he gained several successes in Bavaria. In 1744 he was appointed governor of the Netherlands, where he thwarted a French invasion of Flanders, and in the same year expelled Frederick II. of Prussia from Bohemia. After the conclusion of peace, in 1748, he devoted his energies to the Netherlands, introducing great reforms.

**Charles Augustus, Grand Duke of Saxe-Weimar** (1757-1828), son of Duke Ernest Augustus. Upon assuming the reins of government, in 1775, summoned Goethe to his court. His capital, Weimar, became the centre of the intellectual life of Germany, and the residence of Goethe, Schiller, Herder, and Wieland. He was the first German sovereign to give his subjects a constitution and to establish freedom of the press.

**Charles City**, city, Iowa, county seat of Floyd co. It is the seat of Charles City College (German Methodist); p. 8,681.

**Charles Edward.** See *Stuart*.

**Charles Eugen, Duke of Wurtemberg** (1728-93), son of Duke Charles Alexander (1684-1737), launched out into luxurious display, in the vain effort to make his court one of the most brilliant in Europe. He became an ardent economic reformer; encouraged agriculture, especially the cultivation of the vine; and fostered art and science by creating schools, especially the renowned Karlschule in Stuttgart.

**Charles Louis, Archduke of Austria,**

**Duke of Teschen** (1771-1847), third son of the Emperor Leopold II., was born at Florence. He was adopted by the Duke of Saxe-Teschen, whom he succeeded in 1790 as governor of the Netherlands. He was appointed field marshal, and sent to command the Army of the Rhine. He conducted a glorious campaign, winning many victories. He was next given the command of the Austrian forces in Italy, and sent to oppose Napoleon; but he was not successful, and the campaign ended with the Peace of Leoben.

The Archduke Charles was next appointed governor of Bohemia, where he tried to reorganize the army. In 1801, being appointed chief of the military council, he introduced



*St. Philip's Church, Charleston, S. C.*

sweeping and effective reforms in the Austrian army; while he was concentrating in Western Hungary he received the news of the defeat at Austerlitz. Napoleon expressed the desire to have a personal interview with the greatest of his adversaries, and the meeting took place at Stammersdorf, near Vienna.

The Archduke was strongly opposed to the declaration of war in 1809, but when it broke out he occupied Munich, in April, 1809. He defeated Napoleon at the Battles of Aspern and Esslingen; but as he did not take full advantage of these victories, Napoleon was able to cross the Danube on the night of July 4-5, and force upon Charles the Battle of Wagram. Charles himself was wounded and defeated, but was able to make his retreat in good order, and signed an armistice. The conditions of this armistice displeasing the Emperor, Charles resigned his command and retired into private life.

**Charles Martel**, natural son of Pepin of Héristal (689-741), led the Austrasians against the Frisians and Neustrians. Subsequently he came into conflict with the Saracens, whom he defeated in 732 in an epoch-making battle between Tours and Poitiers. He thus came to be regarded as the savior of Christendom. Though only duke and mayor of the palace, he was for all practical purposes the ruler of the Franks, and he was the real founder of the Carolin dynasty.

**Charles the Bold** (1433-77), duke of Burgundy, born at Dijon, was the son of Philip the Good of Burgundy. As count of Charolais he headed the league of vassal nobles, known as the League of the Public Weal, against Louis XI. of France. For seven years war was waged between Burgundy and France, and in 1475 Charles subdued Lorraine. In the beginning of the following year he invaded Switzerland with 60,000 men, but was utterly defeated by 15,000 Swiss at Granson. The Duke of Lorraine seized this opportunity to reoccupy his dominions, and in a desperate battle at Nancy on Jan. 5, 1477, Charles was slain, and his army routed. Consult *History of Charles the Bold, Duke of Burgundy*, by J. F. Kirk (3 vols.), DeBarante's *Histoire des Ducs de Bourgogne*, and *Mémoires* by Philippe de Comines.

**Charles River**, in Eastern Massachusetts, rises in Norfolk co., and follows a meandering course to Boston Harbor. At Norumbega, above Waltham, is a stone tower which marks the site of a supposed Norse settlement.

**Charleston**, city, South Carolina, port of entry, the county seat of Charleston co., and the largest and most important commercial city in the State. Charleston is laid out with narrow, shaded streets and many picturesque residences. There are more than seventy-five churches, two famous for historical

reasons and beauty of architecture: St. Michael's, built in 1761, having a chime that was imported in 1764, carried to London by the British soldiery in 1780, brought back again two years later, with public rejoicings, sent to Columbia for safety during the Civil War, melted when the city was burned in 1865, recast and replaced three years later; and St. Philip's, of beautiful Gothic design, with a tower 200 feet high carrying a beacon light. In its cemetery lie the remains of Calhoun, Gadsden, Rutledge, Pickens, and other historic figures. Rice, tobacco, fertilizers, coal, oil, oilcake, and cotton are exported, as are also large quantities of manufactured products from the Middle West. Early fruits and vegetables are sent to Northern cities.

Large deposits of phosphate rock, discovered soon after the Civil War, have made the manufacture of fertilizers the city's most important single industry. Other industries include cotton-compressing, and the manufacture of lumber and timber products; p. 71,-275.

Charleston was founded in 1670 by English colonists under Col. Wm. Sayle. In 1685-6 a colony of Huguenots, which made a lasting impression upon both the character and aspect of the city, settled there, and in 1755, the French element was reinforced by 1,200 Acadians from Nova Scotia. The inhabitants of Charleston early united with the other colonists in resistance to Great Britain. In March, 1776, they declared their independence. In May, 1780, Sir Henry Clinton, with 16,000 men, after six weeks' siege, captured it. It was reoccupied by the Americans Dec. 14, 1782. In April, 1860, the Democratic presidential convention was split there by the withdrawal of the Southern delegates. The first secession convention in the United States was held there, Dec. 20, 1860. The first shot in the Civil War was fired in February, 1861, at the steamer *Star of the West* carrying supplies for the United States garrison; and the next at Fort Sumter, April 12, when the fort was captured by the Confederates. For nearly two years, from April, 1863, it successfully resisted a constant bombardment by the Union forces; but not until February, 1865, and because of General Sherman's occupation of Columbia, the State capital, did the Confederates withdraw.

On Aug. 31, 1886, Charleston suffered from one of the most disastrous earthquakes experienced in the United States. Consult Powell's *Historic Towns of the Southern States*

McCrary's *South Carolina* (3 vols.), and Ravenel's *Charleston, the Place and the People*.

**Charleston**, city, capital of West Virginia and county seat of Kanawha co.; p. 67,914. Bituminous coal, natural gas, and salt are found in the vicinity, and there are lumber mills, boat building yards, packing houses, iron foundries and other industries.

**Charlestown**, formerly a city in Middlesex co., Massachusetts, incorporated in 1874 with Boston, is situated on a point between the Charles and Mystic Rivers. Here are a State Prison and a United States navy yard. The Bunker Hill Monument commemorates the battle of Bunker Hill on June 17, 1775.

**Charles Town**, city, West Virginia, county seat of Jefferson co., is situated in a fertile district in the Shenandoah Valley and is a much visited resort; p. 2,926.

**Charles' Wain**. See *Ursa Major*.

**Charleville**, industrial town, France, situated on the left bank of the Meuse opposite Mézières, with which it is connected by a suspension bridge. During the Great War of Europe it was occupied by the Germans and was the seat of German General Headquarters for almost two years; p. 22,634.

**Charlevoix**, town, Michigan, county seat of Charlevoix co., popular as a summer resort; and has lumber and fishing industries; p. 2,299.

**Charlevoix, Pierre François Xavier de** (1682-1761), French traveller and historian, went as a Jesuit missionary to Quebec in 1705. On his second visit he ascended the St. Lawrence and sailed down the Mississippi to New Orleans. His most important work is *Histoire de la Nouvelle France*.

**Charlock**, The Common Charlock, known also as Wild Mustard (*Brassica arvensis*), belongs to the order Cruciferae. It may be known by its small, yellow, four-petalled flowers. It blooms from May to September and is found throughout North America except in the extreme north.

**Charlois**. See *Rotterdam*.

**Charlotte**, city, Michigan, county seat of Eaton co. It has grist mills and grain elevators and manufactures; p. 5,544.

**Charlotte**, city, North Carolina, county seat of Mecklenburg co. It is an important distributing center for textiles, cotton oil, furniture, textile mill machinery and equipment, automobiles and accessories, motion picture films, and dyestuffs. It manufactures cotton and its by-products, agricultural implements, cotton gin machinery. Charlotte

was settled about 1750, and incorporated in 1768. In May 1775, the famous convention of the county militia met here and adopted certain patriotic resolutions which have since remained a matter of dispute. In 1780 Lord Cornwallis occupied the town for several days; the historic oaks under which he maintained his headquarters are still preserved; p. 100,899.

**Charlotte Amalie**, or **St. Thomas**, city, Virgin Islands, on the southern coast of the island of St. Thomas, of which it is the capital; p. 8,600.

**Charlottenburg**, town, province of Brandenburg, Prussia, is situated on the Spree, just w. of Berlin, of which it is practically a residential suburb, though administered separately. It owes its name and existence to the royal palace which was built in 1695-1707 for Sophie Charlotte, wife of Frederick I. of Prussia; p. 353,000.

**Charlottesville**, city, Virginia, county seat of Albemarle co. It is the seat of the University of Virginia, founded by Thomas Jefferson in 1819; Monticello, the home of Thomas Jefferson, is 3 m. to the s. The city is situated in a fine fruit-growing district and has manufactures of iron, lumber, flour, silk, cigars, and textiles; p. 19,400.

**Charlottetown**, city, Canada, the capital of Prince Edward Island and county seat of Queen's co. The city is built on rising ground overlooking the harbor. Notable edifices are the Provincial Government and Dominion building; p. 11,837.

**Charm** (through Fr. from Lat. *carmen*, 'a song'), properly a form of words, generally in verse, supposed to possess some occult power of a hurtful, a healing, or a protective kind; hence applied to anything which exercises an irresistible power to please and attract.

**Charmes, Francis**, (1848-1916), French journalist and 'Immortal.' He was editor of the *Journal des Debats* and manager of the *Revue des Deux-Mondes*. He held various public offices and was a member of the Chamber of Deputies. He published *Etudes historiques et diplomatiques; L'Allemagne contre l'Europe; La Guerre, 1914-15*.

**Charnel-house**, a chamber situated in a churchyard or other burying-place, in which the bones of the dead which were thrown up by the grave-diggers were reverently deposited. It was often a chapel with a vault beneath.

**Charnwood Forest**, barren but picturesque tract, England, culminating in the vol-

canic Bardon Hill, 853 ft. The district was enclosed by Act of Parliament in 1812, because of its geological interest.

**Charny, Count of.** See **Chabot, Philippe de.**

**Charon**, in classical mythology the son of Erebus and Nox, appointed by the gods to ferry the souls of the dead across the river Styx. He is generally depicted as a squalid but vigorous old man.

**Charondas**, an ancient Greek lawgiver of Catana in Sicily, who probably lived between 600 and 500 B.C. He is said to have killed himself for having inadvertently broken one of his own laws.

**Charpentier, Gustave** (1860- ), French composer, was born in Dieuze, Alsace-Lorraine. *La vie du poète* was produced in 1892 and established his reputation; but his most important work is the opera *Louise*, first produced in Paris in 1900. Other works are *Impressions d'Italie*, *Fleurs du Mal*, *Sérénade à Watteau*, *Orphée*, *Tête rouge*, and *La Couronnement de la Muse*.

**Charpentier, Johann Friedrich Wilhelm Toussaint von** (1738-1805), German mining expert. In 1785 he went to Hungary to study an improved chemical process, which, on his return to Freiberg, he introduced into the chemical work at the mines. In 1801 he became director of the mines there.

**Charr**, or **Char**, a group of salmonoid fishes, belonging to the genus *Salvelinus*. The *Salvelinus fontinalis*, commonly known as the American Brook Trout, is probably the most beautiful and favorite game-fish in American waters. See **TROUT**.

**Charriere, Agnes Isabelle, Madame Saint-Hyacinthe de** (1740-1805), French writer, was born in Utrecht, Holland. She was married to a Swiss nobleman and settled near Neuchâtel. She was a friend of Madame de Staël. Among her works *Calliste* is her masterpiece.

**Charron, Pierre** (1541-1603), French divine and ethical philosopher. He was a friend of Montaigne and borrowed largely from the latter's writings. His treatise *De la Sagesse*, which appeared in 1604, was more than once translated into English.

**Charruas**, a war-like South American people formerly dominant in Uruguay and the adjacent parts of Southern Brazil, where the progress of settlement was long retarded by their stubborn resistance. By 1832 they are said to have been practically annihilated.

**Chart**, a marine map of a portion of

the sea or other body of water, for practical use in the navigation of ships. The invention of charts is generally ascribed to the Italians. The earliest chart extant of which the date can be fixed is Vesconte's chart of 1311. Meridians and parallels were first represented on charts in 1427 by equidistant parallel straight lines, dividing the chart into equal squares or rectangles. These were charts in which the sphericity of the earth was disregarded and they were known as 'plain charts.' In 1569, Gerhard Krämer, a Flemish map-maker, better known by his Latin name of Mercator, published his famous Universal Map, taking into account the sphericity of the earth in his system of projection or lines representing the meridians and parallels. A chart constructed on this projection is known as a Mercator chart. It has the unique property that the course of a ship sailing on a constant bearing (crossing the meridians at a constant angle) is represented by a straight line. This is so valuable to navigation that almost all charts are constructed on the Mercator projection. Charts are considered so vital to the safe navigation of ships, and therefore in promoting commerce, that the governments of most of the maritime nations of the world produce them and sell them at a price that is insignificant compared to their cost. In the United States the U. S. Coast and Geodetic Survey of the Department of Commerce, produces charts of the coasts of the United States and its possessions; the Hydrographic Office of the Navy Department produces sailing charts of the oceans and foreign charts; in Great Britain the issuing of charts is done by the Hydrographical Department of the British Admiralty.

**Charter**, a formal document emanating from the sovereign power, in the nature of a grant, either to the whole nation, or to a portion of the people, or to a colony or dependency, assuring to them certain rights or powers. In England the Great Charter of King John is a striking example of a sovereign bestowing rights upon the whole body of people. In the United States most corporations are created by charters granted by act of State legislature.

**Chartered Companies**, trading companies operating under special charters granted by the sovereign power. Such companies have played a large part in the history of colonization and in the building up of the British Empire, although colonization was not always their avowed purpose. Among the most famous of the early companies are the British

East India Company and the Hudson's Bay Company.

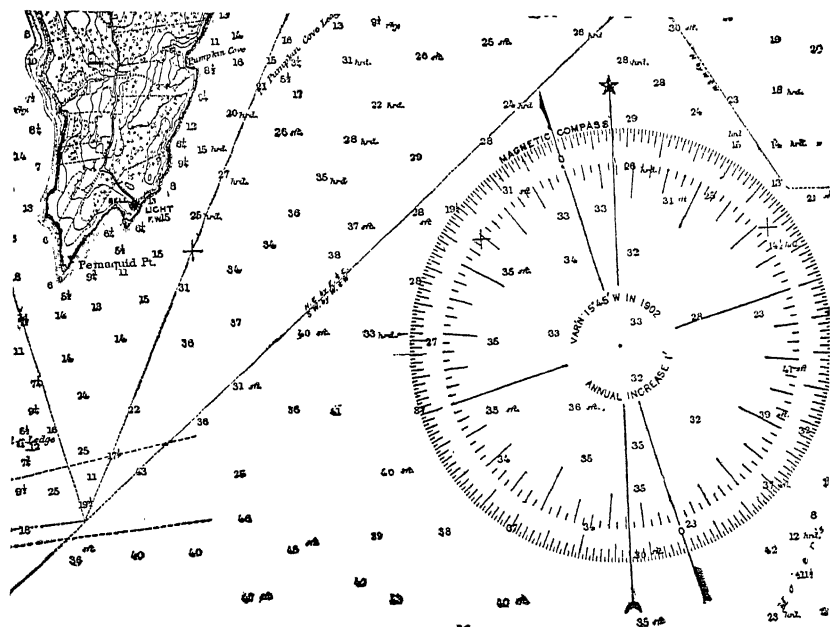
**Charterhouse**, the ultimate form of Charreux or Carthusian, a hospital and school, erected on ground once occupied by a Carthusian Monastery in Charterhouse Square, London. The school is no longer a school exclusively for 'poor children'; it is now under a different governing body from that of the hospital, and is one of the great public schools of England. Consult Taylor's *Charterhouse of London*.

**Charteris, Archibald Hamilton** (1835-1908), Scottish clergyman and educator. In

the service of a merchant for a definite time, or more often for a definite voyage or voyages.

**Chartier, Alain** (c. 1390-1441), French writer. Living during the period of the Hundred Years' War, he tried to fortify the courage of his countrymen by his poems—*Le lay des quatre dames* (1415), *Traité de l'espérance*, *La ballade de fougères*, *La belle dame sans merci*. His best political work is *Le quadriloge invectif*, in which he shows the reasons of the downfall of his country and the remedies for its salvation.

**Chartism**, a popular reform movement



Section from a U. S. Coast and Geodetic Survey Chart.

1901 he became chaplain in ordinary to the King in Scotland. His published works include *Life of Professor James Robertson*; *The Church of Scotland*.

**Charter Oak**, an oak tree (standing until 1856) in Hartford, Conn., in which, according to tradition, the Connecticut Charter was concealed in 1687, when Gov. Edmund Andros, whose jurisdiction included Connecticut, came to demand its surrender to the Assembly.

**Charter Party**, a contract between a merchant and a shipowner, by which the shipowner agrees to put the whole of his ship at

in England in the third and fourth decades of the 19th century, occasioned by the widespread disappointment with the political results of the Reform Bill of 1832. The six points included in the charter, drafted by Francis Place, were: Universal Suffrage, The Ballot, Annual Parliaments, Payment of Members, Equal Electoral Districts, and Abolition of Property Qualifications. These were not peculiar to the Chartists, but were adopted chiefly from John Cartwright's *Plan of Reform* (1776) and from the Duke of Richmond's bill of 1780, called the 'People's Rights' measure.

Its history may be divided into two periods, the first aiming at industrial amelioration, while the second conceived this industrial reform as a more or less definitely socialistic revolution. The first period lasted from 1836 to 1839, the second from 1840 to 1848. The Chartists, though their ostensible objects were political, had recourse to menaces in place of parliamentary action, and eventually to open disturbances. The Chartists revealed their revolutionary tendencies by their refusal to support the Anti-Corn Law League, because the repeal of the Corn Laws would, by cheapening food, keep down wages and benefit the middle classes only. After 1848 the movement died out. Industrial conditions became more favorable, and the leaders became identified with agitation for more specific reforms. Most of the political reforms demanded by the Chartists have since been granted. Consult Gammage's *History of the Chartist Movement*.

**Chartres**, (anc. *Autricum* of the Car-nutes), town, France. Its glory is the cathedral of Notre Dame, one of the finest examples of Gothic architecture. Some parts of the building date from 1120, but most of it belongs to the early 13th century. It has two spires, the northwestern being regarded as one of the most beautifully designed spires on the Continent; other features of note are the three rose-windows, and the remarkable stained glass (13th century) which fills more than a hundred other windows. Held by the Germans, Chartres was liberated Aug. 17, 1944, by American troops; p. 23,630. Consult Cram's *Mont St. Michel and Chartres*.

**Chartreuse, La Grande**, a celebrated Carthusian monastery in France, picturesque-ly situated in an Alpine valley at an altitude of 3,206 ft. It was founded by St. Bruno in 1084. It is a huge pile occupying 12 acres, but repeated conflagrations have left little of the original building. In 1903, owing to the action of the French Government, the monks were again compelled to quit their monastery. The headquarters were removed to Pinero-lo, Italy, and the manufacture of liqueur, for which the monks were famous was transferred to Tarragona, Spain.

**Chartulary**, a collection of charters. The monastic chartularies were registers kept by the several religious houses, in which were entered the deeds and charters from various benefactors, deeds, etc.

**Charybdis**. See *Scylla*.

**Chase, George** (1849-1924), American educator and legal writer. In 1891 the New

York Law School was chartered, and he became dean.

**Chase, Harry Woodburn**, (1883- ), educator, born at Groveland, Mass. From 1910-1930 he was associated with University of N. C.; prof. psychology, 1914-1919; pres., 1919-1930. Pres. Univ. of Ill., 1930-1933, and since 1933, chancellor, New York University.

**Chase, Philander** (1775-1852), American Protestant Episcopal pioneer bishop. He was consecrated Bishop of Ohio 1819. He resigned his presidency and bishopric on account of differences with his clergy in 1831, and on removing farther w. and continuing his labors, was elected Bishop of Illinois. Bishop Chase in 1838 founded Jubilee College at Robin's Nest, Ill. He published *A Plea for the West*, *The Star in the West*, or *Kenyon College*, and *Reminiscences: an Autobiography*.

**Chase, Pliny Earle** (1820-86), American scientist. For his paper on the *Numerical Relations of Gravity and Magnetism* he received the Magellanic Medal of the American Philosophical Society (1864). He published several arithmetical text books and *Elements of Meteorology* (1884).

**Chase, Salmon Portland** (1808-73), American political leader, financier, and jurist. In 1830 he was admitted to the bar and began practice at Cincinnati, O., where he became prominent as a lawyer and also took an active part in politics. He entered the U. S. Senate and was identified with the Liberty Party. Strongly opposed to slavery after 1836, though not technically an Abolitionist, Chase came to be recognized as the leader of the political anti-slavery men. In the political realignment which followed the passage of the Kansas-Nebraska Bill, Chase naturally became the leader of the Republicans in Ohio, and, as a Republican, he was Governor of the state (1856-60). He was an aspirant for the Republican presidential nomination in 1860. On March 4, 1861, he re-entered the U. S. Senate, but resigned on the following day to become Secretary of the Treasury in Pres. Lincoln's cabinet. In temperament, however, the two men were radically different; Chase, easily offended, resigned four times within three years; finally his fifth resignation was accepted. Soon afterward, however, in Dec., 1864, Pres. Lincoln appointed him Chief Justice of the U. S. Supreme Court, and this position he held until his death, May 7, 1873. He presided with fairness over the impeachment trial of Pres. Johnson (1868). Consult Hart, *Salmon Portland Chase*.

**Chase, Samuel** (1741-1811), American jurist. In 1796 Pres. Washington appointed him an associate justice of the U. S. Supreme Court. His practice of commending the Federalist policies in his charges to grand juries was bitterly resented by the Republicans, and he was impeached, Nov. 30, 1804, the trial—one of the most famous impeachment trials in U. S. history—beginning on Jan. 2, 1805. He was declared not guilty.

**Chase, Stuart** (1888- ), economist and writer, investigated the meat and packing industry (1917-22) for the Federal Trade Commission, acquiring an insight into American economic methods which led to several broad surveys of the problems of production, distribution and consumption. His *Men and Machines* (1929) was described as a "preface to ethics" which a mechanized civilization needed and, like his *The Economy of Abundance* (1934), was widely read as America fought the depression. His books discovered an economist who could write of the dismal science with wit and style. Other books: *The Tragedy of Waste* (1925); *Prosperity—Fact or Myth* (1930); *Mexico, a Study of Two Americas* (with Marian Tyler) (1931); *A New Deal* (1932); *A Primer of Economics* (1941); *Goals for America: A Budget of Our Needs and Resources* (1942).

**Chase, William Merritt** (1849-1916), American painter. Chase studied under Wagner and Piloty at Munich, and at Venice, where he made a special study of Tintoretto's works. He returned to New York in 1878 and became a leading influence among the younger men, and was president of the Society of American Artists for ten years.

**Chasidim** (Heb. 'pious'), or Assideans, a Jewish sect or party, which becomes prominent in the Maccabean wars.

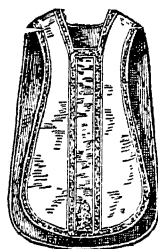
**Chasing and Embossing.** All metals capable of being formed into thin plates or sheets lend themselves to chasing and embossing—i.e. the beating out of bosses from the under surface of the metal in the form of any ornamental design; these bosses are generally worked over from the front, to give detail.

**Chasles, Victor Euphémon Philarète** (1798-1873), French writer. A Jacobin, he was imprisoned after the restoration, but through Chateaubriand's intercession was released. He wrote largely on England. He exercised no little influence upon the literature of his country by his correct critical taste. His 'Discourses' on *De Thou* and *French Literature* were crowned by the Academy. See his *Mémoires*.

**Chassériau, Théodore** (1819-56), French painter; in the schools of French painting forms a sort of transitional link between Ingres and Puvis de Chavannes. His most notable achievement, frescoes on the walls of the Cour des Comptes at Paris, was in great part destroyed in the commune of 1871. See Boquenne's *T. Chassériau: Souvenirs*; Valbert-Chevillard's *Un Peintre Romantique*.

**Chasseurs.** The Chasseurs-à-pied, first organized in 1779, form the greater part of the light infantry of the French army. The Chasseurs-à-cheval form a corresponding division of the mounted forces. The Chasseurs d'Afrique, first organized in 1831, serve in Algeria.

**Chasuble** (Lat. *casula*), the principal vestment worn by the clergy of the Greek and Roman churches during celebration of mass.



Chasuble.

**Chat**, a name sometimes applied to the members of the thrush-like genera *Saxicola* and *Pratincola*. The name is given in the United States to a warbler, the yellow-breasted chat (*Icteria virens*), noted for its musical volubility.

**Château**, (Old Fr. *chastel*; Lat. *castellum*), French feudal fortress, corresponding to castle. Also a French country mansion.

**Châteaubriand, François René, Vicomte de** (1768-1848), French author, was born in St. Malo. In 1791 he visited America, travelling on the Great Lakes, over the prairies, and through the primeval forests, storing up impressions that later bore fruit in his prose epic *Les Natchez*, and the famous *Atala*, and *René*. On his return to Europe in 1792 he took service in the ranks of the *émigrés*, was wounded at Thionville, and subsequently went to England. Again in France in 1800, Châteaubriand established a literary reputation by *Atala*, which appeared in 1801, followed in 1802 by *Génie du Christianisme*, a vindication of the Church of Rome. The success of the work was enormous and Châteaubriand was raised to the foremost rank of French letters. In 1814, following the fall of

Napoleon, he issued a pamphlet, *De Bonaparte et des Bourbons*, declared by Louis XVIII. to be worth an army to the Legitimist cause. He was made a peer and a minister of state, and from 1822 to 1824 was ambassador at the British court. He was the first great writer of French poetical prose. His *Œuvres* were published by Sainte-Beuve in 12 vols. (1859-61). Consult his *Mémoires*; Sainte-Beuve's *Châteaubriand et son Groupe Littéraire*.

**Châteaubriant**, town, French department of Lower Loire. It has several old churches and a castle; p. 7,200.

**Châteaudun**, town in the French department of Eure-et-Loir. Dunois is buried in the chapel of the stately castle; p. 7,000.

**Château-Thierry**, (anc. Castrum Theodorici), town, department of Aisne, France, on the Marne River. It was taken by the English in 1412, by Charles V. in 1545, and by the Spaniards in 1591. Here Napoleon defeated Blücher, Feb. 12, 1814; p. 7,771. In the GREAT WAR Château-Thierry was occupied by the Germans on September 5, 1914, and was the scene of bitter fighting in the ensuing Battle of the Marne, in the course of which it was retaken by the Allies. The Seventh German Army on June 2, 1918, in a drive against the western flank of the French Army, occupied the northern part of the town. American troops having been brought into action on the western and southern side of the salient on June 5, counter-attacked with success. On June 7, the French and Americans took Neuilly-la-Poterie and Bouresches, in the vicinity, and the French captured the important Hill 204 above the town.

In the opening offensive of the Second Battle of the Marne, German troops crossed the river at various points between Dormans and Château-Thierry, near which the Third and Twenty-eighth American divisions were engaged. Foch launched a terrific counter-stroke between Château-Thierry and Soissons. Eight American divisions (1, 2, 3, 4, 26, 28, 32, 42) were employed in cooperation with the French troops. By July 20 Château-Thierry was no longer tenable, and that evening Allied troops were in its streets.

**Châtelet-Lomont, Gabrielle Emilie, Marquise du** (1706-49), learned Frenchwoman, born at Paris, distinguished alike for her beauty and talent. Though married to the Marquis du Châtelet-Lomont, she formed, in 1733, a *tendresse* for Voltaire. She translated the *Principia* of Newton into French. See her *Correspondence* with Voltaire.

**Châtellerault**, town, French department of Vienne. Its river-port makes it the entrepôt for the produce of an extensive district; p. 18,000.

**Chatham**, parliamentary borough, naval arsenal, and fortified town in Kent, England, on the Medway River, 33 m. s.e. of London. Chatham owes its importance largely to its military and naval establishments. Buildings of interest are the ancient Church of St. Mary; hospital of St. Bartholomew; Jezreel's Tower, a huge pile of buildings begun by a sect called the New or Latter Day Israel. The dockyard, founded by Queen Elizabeth, covers over 500 acres. In 1667 the Dutch Admiral de Ruyter sailed up the Medway and burned some ships off Chatham. Roman remains have been found in the town; p. 43,555.

**Chatham**, town, New Brunswick, Canada. It is the seat of a college and of a Roman Catholic bishopric, and has a cathedral, hospital, and other fine buildings; p. 4,666.

**Chatham, William Pitt**, First Earl of (1708-78), English statesman, was born in Westminster, the younger son of a Cornish squire. Entering Parliament (1735) as member for Old Sarum, he began his parliamentary career as an opponent of Walpole. Though Walpole was defeated, no place was found for Pitt in the new ministry, owing to the dislike cherished towards him by the king. At length, however, through his great debating power and commanding influence in the house, he became Secretary of State, 1756, and leader of the House of Commons. Pitt set himself to revive the glory of Britain, dimmed by recent disasters; and with this end he sought to destroy the power of France in America and India. In 1759 Wolfe and his comrades in arms had subjected Canada, and by 1760 the French power in India was destroyed. With the death of the king and the accession of George III. the great war minister received a check. He resigned in 1761. In the dispute with the American colonies over the Stamp Act Pitt played a noble part; he denounced the follies of Grenville and secured the repeal of the Act. The Rockingham ministry vainly endeavored to induce Pitt to return, and on the fall of that administration the king was compelled to ask him to form a ministry. This he did the same year, choosing for himself the office of Privy Seal with a seat in the house of Lords as Viscount Pitt and Earl of Chatham. He spoke strongly against the policy of the government towards the American colonies. When, however, it was



proposed to make peace on any terms he vigorously opposed the motion and secured its defeat. He died at Hayes, near Bromley, in Kent, and was buried at Westminster Abbey. Consult Thackeray's *History of William Pitt, Earl of Chatham*.

**Chatham Chest.** The 'Chest at Chatham,' later the 'Greenwich Chest,' was a fund established, on the recommendation of Sir Francis Drake and Sir John Hawkins, in 1590, for the relief of sick and wounded British seamen. The deduction from seamen's pay, by which the fund was principally supported, ceased only in 1829.

**Chatham Island,** one of the Galapagos group (see GALAPAGOS); also the largest of the Chatham Islands.

**Chatham Islands,** a small group of islands in the Pacific Ocean. At the time of the discovery of the islands by Lieutenant Broughton, in 1791, they were inhabited by Morioris, a race akin to the Maoris, by whom they were in time largely supplanted; p. 477, of which 219 are Europeans.

**Chatillon-sur-Seine,** town, France. Only traces of the ancient Chateau from which the town derives its name remain. There is a good trade in colonial products; p. 4812.

**Chat Moss,** a swampy district about 7 m. w. of Manchester, England. In 1829 the road for the Manchester and Liverpool Railway was carried across the Moss, one of the greatest engineering triumphs of Stephenson.

**Chatrian.** See **Erckman-Chatrian**.

**Chatsworth,** village, Derbyshire, England, seat of the estate of the Dukes of Devonshire. The magnificent park, 9 m. in circumference, is unsurpassed in England. The present mansion has a large collection of pictures and sculptures and there are exquisite wood-carvings. At various times from 1570 to 1581 the old mansion was the place of detention of Mary Queen of Scots.

**Chattahoochee,** river rising in the northern part of Georgia, forming the boundary between Georgia and Alabama.

**Chattanooga,** city, Tennessee, county seat of Hamilton co. It is picturesquely situated near the base of Lookout Mountain, and has fine civic buildings, a public library, museum, and opera house. It is the seat of the University of Chattanooga. Mattresses, agricultural implements, boxes, brick and tile, cars, coffins and leather are manufactured, and there are rich coal mines in the vicinity. One of the severest battles of the Civil War, the Battle of Chattanooga, was fought nearby and the battle fields of Chickamauga, Mis-

sionary Ridge, and Lookout Mountain are not far distant; p. 128, 163.

**Chattanooga, Battle of,** an important battle of the American Civil War, fought near Chattanooga, Tenn., on Nov. 23-25, 1863, between a Federal army of about 60,000 under General Grant and a Confederate army of about 40,000 under General Bragg, the latter being defeated. Consult Johnson and Buel's *Battles and Leaders of the Civil War*.

**Chattanooga, University of,** a coeducational institution of learning at Chattanooga, Tenn., under the auspices of the Methodist Episcopal Church, founded in 1867.

**Chattel Interest** (in land), a leasehold which is personal, as distinct from real property.



*Geoffrey Chaucer.*

**Chattel Mortgage,** an assignment or transfer of personal property as security for a loan or other obligation.

**Chattels,** in law, all movable goods and all property or estate not amounting to a freehold.

**Chatterer,** a name applied to a genus of tropical birds, known also as Cotinga.

**Chatterton, Ruth** (1893- ), actress, born in New York, educated at Pelham School for Girls on the Hudson. At the age

of nine she gave a piano recital in Carnegie Hall. She appeared with stock companies, starred with Henry Miller at seventeen, and in 'Daddy Long Legs,' 1914, and 'Come Out of the Kitchen,' 1916; appeared in 'La Tendresse,' translated by herself from the French in 1922, in 'The Changelings' in 1923, and then turned to the motion picture films where she has made a conspicuous success. Popular film successes were 'A Marriage of Convenience' and 'Madame X.'

**Chatterton, Thomas** (1732-70), English poet. Before he was fifteen he was apprenticed to John Lambert, a Bristol attorney. At this time he began to talk about a mysterious Rowley, the supposed friend and confessor of the Bristol merchant Canynge in the 15th century, and to read to friends poems which he attributed to him. In 1768 the new Bristol Bridge was opened; and the account which Chatterton sent, under the signature 'Dunelmus-Bristolensis,' to Felix Farley's *Bristol Journal*, of the 'Mayor's first passing over the Old Bridge,' was his first published forgery. Later he sent some specimens of old English poetry, including writings by 'Rowley,' to Horace Walpole. Walpole submitted the documents to Gray and Mason, who pronounced them forgeries; whereupon he advised Chatterton to stick to his profession. In 1770 Chatterton went to London, an inexperienced lad of genius, sanguine, yet cynical, too proud to acknowledge his privations, concealing them from his mother and sister by sending them handsome presents while he was starving. On August 24, 1770, after destroying his papers, he took arsenic and died next day. After more or less controversy on the subject it is now established that Chatterton was the sole author of the Rowley poems. Consult *Lives* by Gregory, also Masson's *Chatterton*, and Ingram's *The True Chatterton*.

**Chaucer, Geoffrey**, English poet (?1340-1400). Geoffrey was appointed at seventeen page to Elizabeth de Burgh, wife of Lionel, Edward III's third son. We next find him serving under Edward III, in the French campaign (1359), where he was taken prisoner at Retiers, in Brittany, but was released next year under the treaty of Bretigny. In 1367 he received a life pension of 20 marks (£13 6s. 8d.), as one of the 'valets' of the king's chamber. He was frequently employed abroad, travelling in Italy thrice—while he did secret-service work in Flanders and elsewhere in 1376 and 1377. He treated with France for peace (1377), also regarding the marriage of

King Richard II. (1378)—this period of his life being marked by signs of great prosperity, and for about ten years from 1374 on he held offices in the customs. John of Gaunt, to whose party the poet attached himself, granted him a pension of £10. In addition to his official income, the poet had his share of the frequent dues occurring under the feudal system. In 1386 he sat, as knight of the shire for Kent, in the Parliament held at Westminster. But misfortune now fell on him. Whether owing to genuine dissatisfaction with his work, or to the accession to power of Gloucester, the rival of John of Gaunt, Chaucer was deprived of his offices in December, 1386, and was reduced to raising money on the security of his pensions. These were also taken from him in 1388. An annual pension of £20, granted him in 1394, left him still in difficulties, and four years later he received letters of protection against arrest for debt. The accession of Henry IV., son of his old protector John of Gaunt, brought him some relief: he received a new pension of 40 marks.

The earliest of his poetical works whose date can be exactly fixed is the *Book of the Duchess*, written in 1369 on the death of Blanche, wife of John of Gaunt. To this early period may also be ascribed the translation of the *Romaunt of the Rose*, which we know Chaucer made, but which is not to be wholly identified with the version that has come down to us. The second period of the poet's life (1369-86) is credited with the *Parliament of Birds*, the *House of Fame*, the *Legend of Good Women*, the first draft of the *Knight's Tale*, and other works afterward incorporated in the *Canterbury Tales*, such as the Clerk's tale (*Griselda*), the Second Nun's tale (*St. Cecilia*), and the Monk's tale (*De Hugolino Comite Pise*)—all of which show the strong and direct influence exercised on Chaucer by the Italian poets. The plan of the *Canterbury Tales*, and the execution of many of them, including the writing of the wonderful Prologue, were the work of the poet's final and most troubled period. Chaucer, like Cervantes, had ample experience of life, and the result is that the *Canterbury Tales*, like *Don Quixote*, are not merely a work of genius, but the embodiment of an epoch. He is the 'father of English poetry,' inventing the seven-line stanza and championing portrayal of the life and philosophy of the common people written in natural as opposed to courtly style. Consult Kittredge's *Chaucer and his Poetry*; MacCracken's *The College Chaucer*; the Chaucer Society pub-

lications, especially the six-text edition of the *Canterbury Tales* by Furnivall; and Skeat's *The Chaucer Canon*.

**Chauci**, a powerful German people who dwelt on the shores of the German Ocean, between the Ems and the Elbe.

**Chaudet, Antoine Denis** (1763-1810), French sculptor, born in Paris. After winning the *grand prix* he went to Rome (1784), where, influenced by the prevailing enthusiasm for the antique under Canova, he produced his best-known works, *Peace*, *Paul and Virginia*, *Love*, all in the Louvre.

**Chaumont, Pierre Marie Joseph** (1611-93), French Jesuit missionary among the Canadian Indians. His autobiography appeared in 1688; repub. 1858.

**Chaumont-en-Bassigny** (anc. *Calvus Mons*), cap. of dep. Haute Marne, France. Here was concluded the coalition which ultimately developed into the Holy Alliance; here also the Allies in 1914 agreed by treaty to restore France to her ancient boundaries. There is a large trade in kid gloves; p. 15, 178.

**Chauncey, Charles** (1592-1672), American educator. He held various churches in England until 1637, when he was silenced by Archbishop Laud, who had been displeased with his puritanical attitude for several years. He emigrated to Plymouth, Mass., in 1638, became minister at Scituate in 1641, and accepted the presidency of Harvard in succession to Dr. Dunster, the first president. Among his publications is a volume of *Twenty-six Sermons on Justification* (1659). See *Fowler's Memorials of the Chaunceys*.

**Chaus**, or **Jungle Cat**, an Asiatic wildcat (*Felis Chaus*).

**Chausses**, Fr., originally thickly padded clothing for the legs, but later mail armor which covered the legs and feet. In the 16th century the word was used to designate hose.

**Chautauqua**, a lake of glacial origin in the w. extremity of New York. Its shores are the site of the Chautauqua Institution.

**Chautauqua Institution**. A system of popular education founded in 1874 by Lewis Miller and Rev. John H. Vincent as the Sunday-school Assembly. The place chosen was on the shores of Chautauqua Lake, in western New York. In the following years the development was rapid, sessions were lengthened to two months and courses of study were provided in a large variety of subjects. The institution yearly attracts a large body of teachers and adult students. The cost of the courses is low and various forms of entertainment are free to all in attendance. The

class work of the summer sessions is supplemented by a system which consists of the enrolment of readers for four years' course of home study controlled by a committee of the institution. Assemblies, modelled on Chautauqua, exist throughout the United States.

**Chauvenet, William** (1820-70), American mathematician. He took part in the establishment of the U. S. Naval Academy at Annapolis, Md., and filled mathematical and astronomical professorships there. His textbooks include *Treatise on Plane and Spherical Trigonometry*. See Memoir in *Biographical Memoirs of the Academy*.

**Chauvinism**, exaggerated patriotism, corresponding in France to English and American 'jingoism.' Nicolas Chauvin was a veteran of the republic and the first empire, whose name became a synonym for the blind idolatry formed by Frenchmen for the first Napoleon and his *régime*.

**Chayote**, (*Chayota edulis*), an edible perennial vegetable growing on vines, allied to the cucumber, introduced originally from Central America and Mexico, and now cultivated in many warm parts of the world including the southern United States and California. See bulletin of the United States Department of Agriculture.

**Chazy**, a thick black or gray limestone, is a member of the Ordovician (Lower Silurian) of N. America.

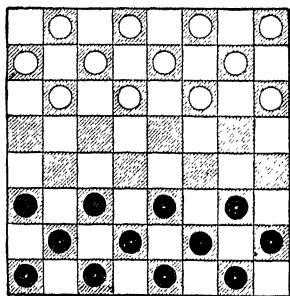
**Cheapside**, a street in London, England, extending between St. Paul's Cathedral and the Poultry. Edward III., in 1327, in the foundation charter of the Goldsmiths' Company, ordered them to keep their shops in the High Street of Chepe.

**Cheboygan**, city, Mich., county seat of Cheboygan co., some manufactures and a considerable fish industry; p. 5, 673.

**Check**, 'a bill of exchange drawn on a bank, payable on demand,' and the rules as to such bills apply generally to checks. If the bank on which it is drawn has funds in hand belonging to the drawer it is bound to honor it, unless the check is stopped by the drawer, or the bank receives notice of the drawer's death, or that he has committed an act of bankruptcy. Payment by a bank of a check in good faith and in the ordinary course of business exempts it from liability should it subsequently appear that the indorsement of the payee or any subsequent indorsement was forged. It is not, however, protected when it pays a check on which the drawer's signature is forged, as a bank is presumed to

know its customer's signature. Checks are payable in order of their presentment, and an unreasonable delay in the presentment of a check will relieve the drawer of liability if the bank in the meantime suspends payment, provided the depositor had sufficient funds in the bank to pay the check if it had been reasonably presented and he has suffered by the negligence of the holder. A reasonable time is a question of fact in each case. A check must contain an order to pay a fixed and definite sum of money to some designated person or order.

**Checkers**, or **Draughts**, one of the most ancient forms of recreation. Ramesses III, as depicted on the walls of Thebes in Egypt, is playing checkers with a lady. The game of draughts is a contest between two parties, each having 12 pieces or men, those of one side being dark and those of the other light in color. The game is played on a board and the men are placed on squares of one color



Checkers.

only. The object of the game is to capture all the adversary's men, or to fix them so that they cannot move. Each player in turn moves one of his men one square forward on the same color, that is, diagonally. When two opposing men meet, if either has an empty square behind him, the opponent at his next move jumps over the man, who is thereby captured and removed from the board, and the victor occupies the empty square behind him, thus advancing two squares. If there are two or more of the opponent's men in front, each with a vacant space behind him, all can be captured at once and the capturer occupies the square behind the last man taken. When a man has been advanced to the last row in the enemy's camp he becomes a 'king,' and his rank is marked by 'crowning' him with another piece of the same color. A king is like other men

in all respects, except in his power of moving backward and forward; he is equally liable to capture; and captures in the same way, except that he can also capture backward. There are, however, several other varieties of the game. See *Spalding's Home Library*; Foster's *Complete Hoyle*.

**Checquy**, **Checqui**, or **Chucky**, in heraldry, signifies small squares of different tinctures, composing the field or the charge of a shield or escutcheon. The word also survives in our term 'check,' a cloth pattern.

**Chedorlaomer**, King of Elam, chief of the four kings in their victorious campaign against the five rebel Canaanite princes.

**Cheduba**, or **Man-aung**, a fertile and wooded island on the e. coast of the Bay of Bengal; p. 24,000.

**Cheese**, a food product obtained by coagulating the caseine of milk and incorporating a large proportion of the fat. It was a common food material long before butter was known. There are many kinds of cheese, depending upon the kind of milk used and the treatment it is subjected to in the process of making and curing the product. Some kinds are hard, while others are soft or midway between; and in flavor there is great variation. In the common Cheddar cheese of the United States and England the milk is curdled with rennet extract, a soluble ferment found in the fourth stomach of calves, the curd separating from the watery whey and holding mechanically a large proportion of the fat. The mass is then wrapped in cloths and pressed to remove the remaining whey. It is then placed on shelves in the curing-room and allowed to 'ripen,' a process requiring several weeks, and often months. During the process the flavor is developed and the tough curd is 'broken down' or digested through the action of the pepsin in the rennet and probably also that of a natural ferment of the milk, known as galactose. In making cottage cheese, or 'smierkase,' the milk is curdled by allowing it to sour, or by the addition of an acid to fresh milk, and the cheese is salted and eaten fresh.

The principal English cheeses are Cheddar, Stilton, Cheshire, Gloucester, Dorset (blue), Wensleydale, and Cotherston. The most popular foreign cheeses are Schweitzer or Emmenthaler (also known as Gruyère), Roquefort, Edam Gouda, Gorgonzola, Parmesan, Neuchâtel, Camembert, Limburger and Brie. The last four are soft cheeses, and Roquefort is a semi-soft variety. The characteristic flavors of the foreign cheeses are due largely to

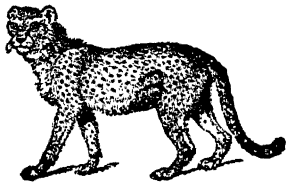
the bacteria or moulds which are active in ripening and in some cases goats' milk is employed. Various fancy brands of cheese such as 'Club House,' 'Canadian Club,' 'Snappy' and other brands put up in jars in the United States and Canada, are made by grinding Cheddar cheese with the addition of cream or butter, and some flavoring materials. Soft cheeses are made by allowing the curd to drain, without pressure, upon inclined mats of straw. Many of the foreign cheeses such as Edam, Schweitzer, Neuchâtel and Roquefort are now made in the United States, but most of the cheese made there is Cheddar, and it is made largely in cheese factories rather than at farm dairies, the milk being hauled to the factory from the farms of its patrons.

As a food cheese is highly nutritious and a valuable source of energy. Cheese has considerable value when used in combination with other foods such as bread, toast, macaroni, and rice, and as a dessert has an undoubted value in stimulating the secretion of the digestive juices. Consult Decker's *Cheese Making*; Wing's *Milk and Its Products*; Bailey's *Food Products*; *Their Source, Chemistry and Use*; U. S. Department of Agriculture, *Farmers' Bulletins*.

**Cheese-hopper**, the larva or maggot of the cheese-fly (*Piophilæ casei*), which lays its eggs on cheese and ham.

**Cheese-mite** (*Tyroglyphus siro*), an arachnid which lives on cheese and dried fruit.

**Cheeta**, or **Hunting Leopard** (*Cynælurus jubatus*), a carnivore resembling the cat family but like the dog family in the imperfectly-retractile and therefore blunt claws. It resembles the dog in being readily tamed. It is trained for hunting purposes, and is so used at the present time in India.



*Cheeta, or Hunting Leopard.*

**Cheever, George Barrell** (1807-90), American clergyman and author. He was a zealous advocate of the anti-slavery cause. His books include *Studies in Poetry*; *God against Slavery*.

**Chefoo**, city, China, in the province of Shantung, at the entrance of the Gulf of Pechi-li, much frequented as a health resort in

summer. It was occupied by the Japanese early in the China-Japan War; p. 132,000.

**Cheilanthes**, a genus of small ferns of the subdivision Polypodiaceæ.

**Cheiranthus**, or **Wallflower**, a genus of hardy and half-hardy cruciferous plants. The biennial or perennial *C. cheiri*, the European wallflower, is the best known species.

**Cheiomancy**. See **Palmistry**.

**Cheke, Sir John** (1514-57), English renaissance scholar. He was secretary of state during the brief reign of Lady Jane Grey.

**Chekhy**. See **Bohemia**.

**Chekhov, Anton Pavlovitch** (1860-1904), Russian dramatist and short story writer. His writings include more than 100 short stories, several plays and a novel. Most of them have been translated into French, German, and English, notably, *Philosophy at Home*, *The Kiss and Other Stories*, *The Swan Song*, *The Three Sisters* and *Uncle Vanya*.

**Che-kiang**, or **Cheh-kiang**, maritime province of China. The eastern part includes many islands. It is hilly throughout and traversed from s.w. to n.e. by the Nan-shan range. Before the Taiping rebellion it was one of the richest and most thickly populated provinces in China. It is still the center of the silk trade. It has also rich fisheries off the coast, that of the cuttle-fish, from which sepia is manufactured, being noteworthy. Off the coast of Che-kiang is the Buddhist sacred island, called Puto; p. 22,043,300.

**Chelan**, lake of glacial origin, situated at an altitude of 1,080 ft., on the eastern slope of the Cascade Range in Washington. Its shores are lined with summer resorts and there is good fishing in its waters.

**Chelmsford**, market town, England, in Essex, 29 m. n.e. of London; p. 20,761.

**Chelmsford, Frederic Augustus Thesiger**, Second Lord (1827-1905), British general. He served in Crimea, Indian mutiny, and Abyssinian campaigns. He was in chief command during the Zulu War of 1879 and decisively defeated the Zulus at Ulundi.

**Chelonia**. See **Tortoises and Turtles**.

**Chelsea**, a residential section of London, on the n. bank of the Thames. The embankment is a fine promenade opened in 1874. Noteworthy features are Chelsea Hospital, built by Wren, 1682-92, a refuge for old and disabled soldiers; Chelsea Old Church, probably founded in the middle of the 12th century; and Cheyne Walk, an attractive row of red-brick Georgian houses, several of which were at one time occupied by such famous personages as George Eliot and Thomas

Carlyle. Chelsea has been the home of artists and literary people from the 16th century to the present day. Here lived Sir Thomas More, Queen Elizabeth (then Princess), Anne of Cleves, Turner, Whistler, and other celebrities.

Ranelagh Gardens, once famous as a fashionable resort, now form part of Chelsea Hospital gardens; p. 59,026.

**Chelsea**, city, Massachusetts, Suffolk co., 2 m. n. of the State House in Boston, and between Charlestown and East Boston. Important institutions and buildings include a U. S. Marine Hospital, Naval Hospital, and Soldiers' Home; p. 41,259.

**Cheltenham**, municipal and parliamentary borough and health resort, England. The town, which owes its importance to its mineral springs, discovered by accident in 1716, is sheltered by the Cotswold Hills; p. 49,385.

**Cheltenham College**, an English public school in Cheltenham, founded in 1841. The popular 'Cricket Week' in August is held here.

**Chemical Affinity**. See **Affinity, Chemical**.

**Chemical Analysis**. See **Analysis, Chemical**.

**Chemical Energy** is the energy involved in the union or disunion of atoms to form molecules. Every chemical change involves an amount of energy depending upon the nature and extent of the change in condition of the atoms involved, but chemical energy must not be confused with the energy of the disintegration of the atom itself, such as that evolved from radium.

**Chemical Engineering**, a branch of the engineering profession, as a distinct profession has been comparatively recent. The first curriculum called chemical engineering was established at Massachusetts Institute of Technology in 1888. The professional society of chemical engineering, the American Institute of Chemical Engineers, was not organized until 1908. The World War gave a great stimulus to chemical engineering because of the great importance of explosives, gas, and other munitions that could be manufactured on a large scale only with the aid of the chemical engineer.

The industries in the following groups use the services of chemical engineers: i. Heavy chemicals, such as sulphuric, nitric, hydrochloric and phosphoric acids; ii. Fine chemicals, such as synthetic pharmaceuticals, dyes and their intermediates. iii. Pulp, paper, cellulose, rayon, cellophane, artificial leather, explosives. iv. Petroleum, gas, coke, charcoal,

coal tar. v. Rubber and allied products. vi. Paints, varnishes, lacquers and other protective coatings. vii. Food products such as sugar, starch, salt, and processed foods. viii. Fertilizers. ix. Glass, refractories, enamelled products, clay products; cement and other non-metallic building materials. x. Leather, glue, gelatin. xi. Metals and alloys. xii. Fermentation products, alcohol, solvents. xiii. Textiles.

Representative accomplishments, many of them recent, of chemical engineering include the development of rayon, nylon, Lucite, and other fabrics and plastics; quick drying lacquers, which have profoundly changed protective coating practice; the development of rubber technology; as well as development and application to a myriad of new uses of synthetic plastics, such as bakelite. Modern chemical engineering is based on three fundamental subjects: physics, chemistry and mathematics. The chemical engineer in his work is in intimate touch with mechanical engineering, economics, and in some cases, electrical engineering. Courses in Industrial Chemistry formed the accepted educational background of the chemical engineer during the pre-war period. Significant and important developments, due largely to the skillful use of chemistry in the solution of industrial problems, date from this era.

As a result of the great stimulation of the chemical industries during the World War, which demanded pioneering work on the engineering side of chemical engineering, it was recognized that the purely chemical approach was not adequate. A reexamination of the problem of chemical engineering education was made, and as a result of this analysis, the conception of the 'unit operation' was adopted and has since met with widespread acceptance. Instead of viewing chemical engineering as a group of different isolated processes and industries, the unit operation method is based on the fact that, no matter how diverse are these processes with respect to raw materials, chemical reactions, methods of control, details of operation, economic characteristics, and finished products, they are all built of a relatively small number of fundamental unit operations. A representative list of unit operations is: Flow of Fluids; Transportation of Solids; Flow of Heat; Evaporation; Humidification and Related Operations; Drying; Distillation; Gas Absorption; Crystallization; Extraction; Filtration; Mixing; Crushing and Grinding; Mechanical Separation.

tion; Combustion Processes and Furnace Design.

Although modern chemical engineering is built around the unit operation idea, a knowledge of the unit operations alone is not enough for a broadly trained chemical engineer. The chemical industries as a whole form a closely-knit economic whole; a significant development in the technology of one of the industries usually exerts an important influence on the economic position of others. Many chemical engineers are in managerial positions and must be thoroughly conversant with broad economic principles, cost accounting, and other business subjects. Each industry is analyzed from the points of view of the fundamental chemistry involved, of the application of the unit operations represented in it, and of its economic interrelationship with the other chemical industries.

Due, perhaps, to the fact that modern chemical engineering is still in the formative state and perhaps to the close historical association with the science of chemistry, research is stressed in chemical engineering to a considerably greater extent than in other branches of engineering. Since research has been directed along the lines of the unit operations, chemical engineers have carried out very significant fundamental investigations. The recognition of adequate analysis and testing has spread to department stores and individual laboratories as well as to corporations and government laboratories. Many smaller manufacturers unite themselves in groups toward establishment of research. In Europe, there are cartels; in England Imperial Chemical Industries, Ltd. is an extremely powerful group.

Closely allied to research is the procedure usually described as development. In converting a small scale theoretical or laboratory process to complete plant operation it is far more efficient to carry out the development in steps rather than to attempt to change from small to large scale in one step. The intermediate stages of constantly increasing scale are stages in the development and many chemical engineers are engaged in such work. The education of chemical engineers has been the subject of much discussion, considerable controversy, and rapid change during the years after the World War. The American Institute of Chemical Engineers has done important service in bringing these discussions to a head. A considerable proportion of chemical en-

gineering graduates supplement their undergraduate training by one or more years of graduate study, with emphasis given to research. The chemical industries place a premium on such work, and as a result the number of men going on to Master's and Doctor's degrees is unusual for a technical field. There is very much less training of graduates by the industries than is the case with other branches of engineering. Consult Walker, Lewis and McAdams, *Principles of Chemical Engineering* (1927); Badger and McCabe, *Elements of Chemical Engineering* (1931); Read, *Industrial Chemistry* (1933).

During the years of World War II, advances in the field of chemical engineering quickened and expanded. Synthetic rubbers appeared in alphabetical procession—from Agripol to Witcogum. Military explosives increased ammonia and toluene manufacture and required new capacity for production of methanol and sulfuric acid. Chemical warfare made heavy demands on, and aviation gasoline called for increased production of, innumerable chemicals. The output of plastics to serve in the place of metals, rubber, and wood increased strongly. Sulfadiazine production also increased enormously, as did that of synthetic vitamins, and many synthetic drugs, such as atabrine.

**Chemical Industry, Society of**, an international association of chemists and scientists interested in the development of industrial chemistry and the branches of industry dependent on chemical principles. The parent association was founded in London in 1881. The meetings of the whole society are generally held abroad, but occasionally in America. The American Society awards the *Perkin Medal* annually for the most valuable work in applied chemistry, and the *Graselli Medal* for the paper presented before the American section within the preceding five years, which offers the most useful suggestions in applied chemistry. The parent society awards two medals to those who have attained eminence in applied chemistry. It publishes a weekly journal *Chemistry and Industry*, the *British Chemical Abstracts* (with the Chemical Society), and the *Annual Reports on the Progress of Applied Chemistry*.

**Chemical Society, American**, a society founded in 1876 in the interest of chemical and allied subjects, is now one of the largest organizations of scientists in the world. Headquarters are in Washington, D. C. It

publishes the *Journal of the American Chemical Society*; *Industrial and Engineering Chemistry*; *Chemical Abstracts*; *Chemical Reviews*; *American Chemical Society Monographs* (2 series); *Journal of Chemical Education*; *Journal of Physical Chemistry* (in cooperation with British societies).

**Chemin des Dames**, a celebrated shaded road, constructed by Louis xv. along the heights north of the Aisne, the scene of desperate fighting in the Great War.

**Chemistry** is the science of matter; it embraces within the scope of its investigations the entire material universe and all phenomena involving matter or its changes. The fundamental conception of chemistry, as of all science, is that we live in an ordered universe where nothing 'just happens' without relation to anything else, but where cause produces effect and similar effects may be expected from similar causes. When man first began to observe the world into which he was born, the evanescence of most of the things he saw overawed him. Everywhere the cycle of growth, maturity, and decay was present. So it was that the ancient philosophers—Aristotle particularly—sought the fundamental essences of things which might conceivably be the units of matter, remaining permanent themselves and undergoing change only by union and disunion with one another. Thus it was that fire, water, earth, and air came to be regarded as the essences of matter, and of these all matter was believed to be made up. A piece of wood, for instance, when burned, was apparently separated into these four elements, fire, smoke that appeared to be air, ashes or earth, and water that oozed from the end of the stick as its middle portion was consumed. It is interesting to note that, with the exception of the element fire, Aristotle's elements represent the three physical states of matter now recognized, solid (earth), liquid (water), and gas (air).

Many centuries passed before anything of importance was added to Aristotle's conceptions. Aristotle had already reached, by purely mental processes, a kind of molecular hypothesis which supposed all matter to be made up of almost inconceivably minute but discrete particles. Stahl in the early years of the 18th century added to these ideas the conception of phlogiston to assist in explaining the phenomena of fire, and Robert Boyle gave a more definite conception to the term element, which he defined as a simple substance incapable of being taken apart into

simpler ones. Later Priestley and Scheele discovered the true nature of oxygen and gave to Lavoisier the background for the first and perhaps the greatest of the general laws of matter, that of its indestructibility.

Lavoisier was the first to apply accurate weighing to chemical experimentation; he found that whatever he might do to it, the quantity of matter involved in any experiment always remained precisely the same at the end as at the beginning. Lavoisier was able to show, by heating mercury in a vessel of air, that it gained weight to precisely the extent that the air lost weight. This experiment was typical of many conducted by Lavoisier, on which he based the establishment of the science of chemistry as it is now known.

As even the most precise measurements have failed to reveal any facts at variance with Lavoisier's conception, it is now known as the Law of the Conservation of Matter. It is stated: *Matter can neither be created nor destroyed*, whatever other changes it may undergo. A similar law formulated by von Helmholtz, on the basis of experiments by Rumford, Joule, and others, states that energy is similarly permanent and cannot be destroyed or created. Upon these two fundamental conceptions the entire superstructure of physical science is based.

With the indestructibility of materials in mind, we must now consider the nature of the changes through which they pass. Two kinds of changes are recognized: those involving internal transformations of one kind of matter into another essentially different and those in which there is a mere alteration of external characteristics without a change of character. These two types of change may be illustrated by a simple tallow candle. If the candle be burned in the air in a closed vessel, it appears to vanish, and instead of air, tallow, and string, the vessel contains the remnant of the air (nitrogen), a gas (carbon dioxide), a liquid (water), and mineral residue in the form of ash. If, however, the vessel be weighed before and after, its weight will not have changed, although there has been a fundamental change in the very nature of the materials in it. This is called a *chemical change*, for there has been a complete transformation of the materials involved into others essentially different. If, on the other hand, the candle be simply heated without being allowed to ignite, the tallow composing it becomes a liquid instead of a solid, and it is no longer a candle. The liquid



tallow, however, is different merely in appearance from the original solid, and the air in the vessel surrounding it is quite the same as before. The liquid tallow will burn quite readily on a wick, and the air about it will support its combustion, as was not true after burning the candle, as above. The change of form without change of nature is a *physical* change. A bitter debate between two chemists of the early 19th century, Proust and Berthollet, led the former to what is now known as Proust's law, or the Law of Definite Composition. Berthollet contended that the composition of a chemical compound was not necessarily a fixed thing, but depended upon the proportions of its constituents present at its formation. Proust vigorously disagreed with this view and contended that the relative proportions were of no importance, but that the one less abundant would satisfy itself by combining with the proper amount of the other, leaving a residue of the more plentiful element. In a long series of brilliant experiments he succeeded in showing the truth of this view, demonstrating, for instance, that 16 parts of oxygen and 200 parts of mercury (by weight) would form mercuric oxide and that no other ratio would serve to form that particular compound. Proust's law is stated: *Any chemical compound always is made up of precisely the same proportion by weight of its constituent elements.*

John Dalton, having before him the idea of indestructible matter and Proust's law of definite composition, investigated the nature of many compounds formed by chemical change from the standpoint of their component parts (elements in the sense of the term used by Boyle) and the ultimate particles of matter as he conceived them are now considered to be those which cannot be subdivided *without altering the nature of the substance* and they are now called *molecules*. In general the idea of the molecule as the unit in physical change and of the atom as the chemical unit still holds.

Dalton was led to the theory of atoms by quantitative investigations of the formation of chemical compounds. He reached the conclusion that individual chemical compounds always have a definite composition and that where more than one compound of two elements exist there is a simple numerical ratio between the proportions in them. In other words, a fixed amount of carbon combines with a definite amount of oxygen (or hydrogen) as in carbon monoxide (or ethy-

lene), or with precisely twice that amount as in carbon dioxide (or methane). The Law of Multiple Proportions is stated: *When two elements unite to form more than one compound the weights of one uniting with a fixed weight of the other stand to each other in a simple numerical ratio expressible by simple whole numbers.*

Dalton reasoned even beyond this. Briefly stated his theory is:

- '(1) Every element is made up of extremely small indivisible particles called atoms.
- '(2) The atoms of different elements possess different weights, but all those of the same element possess the same weight.
- '(3) Chemical compounds are formed by the union of atoms in simple numerical proportions.'

This theory has been indispensable in the progress of chemical science. The assumption of atoms, for example, simplifies the law of indestructibility of matter. In every field of chemistry the atom is the fundamental unit. While no longer regarded as an indivisible entity, it is still the basis for the study of chemical reactions and for chemical formulas. See ATOM.

The next important additions to chemical theory were made by Gay-Lussac and by Avogadro. Gay-Lussac showed that *Chemical reactions between gases occur always between volumes (under the same conditions of temperature and pressure) bearing simple numerical ratios to each other and to the volume of the resulting product, if it be gaseous*. In other words, two volumes of hydrogen combine with one volume of oxygen to form two volumes of steam (water in the gaseous state.) Avogadro went a step further by adding the conception of molecules, advancing the theory that *equal volumes of all gases under the same conditions of temperature and pressure contain the same number of molecules*. The molecules he believed to be the ultimate physical particles formed by the union of atoms, whether they be of the same or different kinds.

According to the molecular theory, therefore, a certain number of molecules of oxygen unite with twice that number of molecules of hydrogen to form twice that number of molecules of steam, so that *one* molecule of oxygen goes to produce *two* molecules of steam. The molecule of oxygen, therefore, cannot consist of a single atom, which is indivisible, but must be composed of an even number of

atoms—two at least. No facts with which we are acquainted require the assumption of more than two atoms in each molecule of oxygen gas; consequently that number is adopted as being probably the correct one. Similar observations lead to the same conclusions in the case of the great majority of elements which can be obtained in the state of gas or vapor, but not in all.

Boyle discovered that *the volume of any mass of a perfect gas varies inversely as the pressure upon it*, provided its temperature be unchanged.

Charles observed the effect of temperature on the volume of gases at constant pressure and found that the volume of a given mass of gas at  $0^{\circ}\text{C.}$  was increased by  $1/273$  of itself for each degree (centigrade) of rise of temperature and that each degree of reduction of temperature caused an equal diminution of volume. In other words, if one measures a volume of 273 cubic centimeters of a gas at  $0^{\circ}\text{C.}$ , and at any convenient pressure, and then raises the temperature of the gas to  $10^{\circ}\text{C.}$ , its volume will then be found to be 283 c.c. If, on the contrary, the temperature be lowered to  $-10^{\circ}\text{C.}$ , the volume will be found to have decreased to 263 c.c.

It would thus appear that gas volume would completely disappear if so low a temperature as  $-273^{\circ}\text{C.}$  could be reached. Because of this relation between volume and temperature of gases, the temperature of  $-273^{\circ}\text{C.}$  has been called absolute zero. By constructing a temperature scale based upon known behavior of gases, it is possible to state Charles' law mathematically. This scale of temperature, known as the Absolute or Kelvin (from Lord Kelvin who first proposed it) scale, is obtained by adding  $273^{\circ}$  to temperatures expressed on the centigrade scale. Thus the freezing point of water is  $273^{\circ}\text{A.}$ , and its boiling point  $373^{\circ}\text{A.}$  Expressing temperature by this absolute scale, Charles' law, it may be stated: *At constant pressure, the volume of any mass of gas varies directly as its absolute temperature.*

The general law of perfect gases combines these two in a single equation,  $pV = RT$ , in which  $p$  represents pressure,  $V$  volume,  $T$  absolute temperature, and  $R$  a constant dependent upon the mass of gas under consideration and the units used to express the volume and pressure. This expression has great significance in all problems involving gases and dilute solutions, whose behavior is in many respects similar. It must be noted, however, that it is predicated upon a *perfect*

gas. Various modifications have been proposed to make it precisely applicable to actual gases (notably the equation of van der Waals), but except where the utmost accuracy is required, a condition seldom met, these are unnecessary. All gases well above their critical temperatures—the critical temperature of a gas is that above which it cannot be liquefied by increased pressure—closely follow the gas laws. It is customary to refer gas volumes to standard temperature and pressure (S.T.P.) or normal temperature and pressure (N.T.P.). These two terms designate a temperature of  $0^{\circ}\text{C.}$  ( $273^{\circ}\text{A.}$ ) and a pressure of one atmosphere (760 mm. of mercury) and in all calculations involving gas volumes observed values are converted to this basis of comparison by the application of the gas laws given above.

Two other laws respecting gases are important. Dalton's law states that if a mixture of gases which do not combine chemically be confined within a space, each of them exerts a pressure upon the walls of the vessel equal to that which it would exert if it only were present. The partial pressure thus exerted by each component of a mixture is proportional to its volume in the mixture. Henry's law has to do with the solubility of gases in liquids and states that, at constant temperature, the weight of gas required to saturate a given volume of a liquid is proportional to the pressure upon it. Matter in solution obeys the same laws in the same way as gases; on the basis of this fact, it is believed that materials in solution are in a state very similar to gases. One simply substitutes for the term pressure as applied to gases the osmotic pressure of the solution.

There are many exceptions to the obedience of water solutions to the gas laws, exceptions forming so large a class of substances that they must be specially discussed. Such materials as salt, acetic acid, and concentrated lye are typical of the exceptions, showing practically double the calculated osmotic pressure in water solution. Their solutions, furthermore, have the property of conducting electric current, as solutions obeying the law do not. To explain this fact, the existence of ions (electrically charged parts of molecules) in solutions was postulated, and the theory of electrolytic dissociation was formed. The effect of a solvent in separating electrolytes into oppositely charged ions and of the electric current in causing these ions to move to the oppositely charged plates suspended in the solution is called electroly-

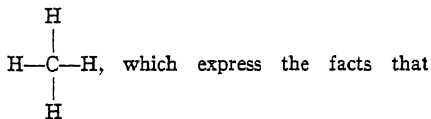
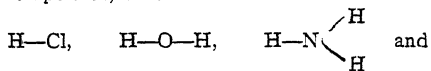
sis and leads us to an important law connecting chemical and electrical energy. Michael Faraday found that *the same quantities of electric current passed through different electrolytes liberate at the poles masses of substances which are proportional to their chemical equivalents*, a chemical equivalent being the quantity of an element or combination of elements exactly satisfying or replacing an equivalent of hydrogen (1.008 units). Faraday's law points to the complete equivalence of the elements and offers a method of arriving at the relative weights of their ions and hence of their atoms. Henry's law is not quite so easy as those of Boyle and Charles to apply to the phenomena of solutions, and when it appears as the so-called law of partition between solvents one has at first some difficulty in recognizing it. It may be stated thus: *A given solute (dissolved substance) distributes itself between two immiscible solvents in the exact proportion of its solubilities in them.*

Possessing the ideas of indivisible atoms of characteristic weights and of these as the units of chemical activity, chemists developed a system of symbols to shorten and clarify expressions representing chemical compounds and reactions. The symbols adopted consist of the initial letter of the name of the element, and where necessary to prevent confusion, another characteristic letter. The names of the elements selected as the source of their symbols are taken from various languages. For instance, the symbols of elements known to the ancients are derived from their Latin names, as Au, gold (aurum); Ag, silver (argentum); Fe, iron (ferrum); etc. Others are derived from the name of the element in the language of its discoverer, as W, tungsten (German, Wolfram), while others come from names common to many languages, as Br, bromine, H, hydrogen, etc.

The symbol of an element not only defines the element but also the relative quantity of it (represented by the atomic weight) intended. For example, NO represents one molecule (30.01 parts by weight) of a compound of one atom of nitrogen (14.01 parts by weight) with one atom of oxygen (16 parts by weight). If there are two or more atoms of an element in a molecule of a compound, this fact is noted by affixing the appropriate subscript number to its symbol, as  $\text{H}_2\text{O}$ ,  $\text{Na}_2\text{O}$ , representing single molecules of hydrogen and sodium oxides, respectively. Using such symbols the course of any chemi-

cal reaction may be represented, together with many facts about it, in a simple equation. For example,  $\text{NaOH} + \text{HCl} = \text{NaCl} + \text{H}_2\text{O}$ , signifies that one molecule of sodium hydroxide (40.008 parts by weight of a compound of a single atom each of sodium, oxygen, and hydrogen) reacts with one molecule of hydrochloric acid (36.468 parts of a compound of hydrogen and chlorine) to yield 58.46 parts of salt (sodium chloride) and 18.016 parts of water.

Valence is the number of bonds of chemical attraction which an atom exerts in uniting with others. Here again hydrogen is taken as the unit, the valence of an atom being defined as the number of atoms of hydrogen with which it will unite or which it replaces in a compound. For example, since chlorine and hydrogen unite atom with atom to form hydrochloric acid ( $\text{HCl}$ ), chlorine is said to have a valence of 1. An oxygen atom combines with two hydrogen atoms to form a molecule of water ( $\text{H}_2\text{O}$ ), and oxygen has, therefore, a valence of 2; one nitrogen atom unites with three hydrogen atoms to form ammonia ( $\text{H}_3\text{N}$ ), thus indicating a valence of 3 for nitrogen. Under different conditions the same element may unite with oxygen to form compounds in which it possesses valences from 1 to 7; thus chlorine and oxygen form three compounds,  $\text{Cl}_2\text{O}$ ,  $\text{ClO}_2$  and  $\text{Cl}_2\text{O}_7$ , in which chlorine has valences of 1, 4, and 7. Without attempting thereby to explain the nature of chemical bonds, chemists frequently indicate them by dashes joining the symbols of elements in compounds, thus:



chlorine, oxygen, nitrogen, and carbon have valences of 1, 2, 3, and 4, respectively, in their compounds with hydrogen.

Before going further with the discussion of chemical reactions, we must consider what is probably the most important of all the laws of matter, the periodic law. This generalization was first reached by a Russian chemist, Mendeléeff, in a form not strictly true but approaching the truth closely enough to be of immense value. Before Mendeléeff's time it had been noticed that the elements could be grouped into families whose mem-

bers closely resembled one another. Such families as the halogens—fluorine, chlorine, bromine, and iodine—possess distinctive characteristics which vary among the members according to their respective atomic weights.

There are several such chemical families among the elements, and Mendeléeff was able to generalize about them by showing that any property of the elements is a periodic function of its atomic weight, with a few notable exceptions. Thus he constructed a table into which all the known elements fitted and which contained blank spaces scattered through it for undiscovered elements. At that time, 1869, a number of blank spaces were necessarily left in the list, but so confident was Mendeléeff of the accuracy of his law of periodicity that he described elements yet undiscovered and even approximated their atomic weights. Subsequent investigations have found most of the missing elements, and remedied omissions and discrepancies in classification. Thirteen elements of the so-called rare earth family, possessing atomic weights very close together and necessarily belonging together were originally crowded into one position in the tabulation. Moseley, a brilliant English physicist, by using a great many of the elements as targets in an x-ray tube, discovered that the characteristic wave length of the x-ray beam emitted decreased as atomic weight increased. From a number of observations using different elements he was able to show that a simple numerical relation existed between the x-ray emission spectra of the elements and from this he calculated a series of numbers, all of them whole numbers, connected with the atoms of the elements in such a way as to express their properties in an exact periodic system. The difficulties with Mendeléeff's system were completely wiped out.

The correct statement of the periodic law must then relate properties to atomic numbers instead of atomic weights. Thus it becomes: *The properties of atoms, both physical and chemical, are periodic functions of their atomic numbers.* The recent discovery of what are called isotopes has added meaning to the atomic numbers of the elements. It appears that many of the elements are really mixtures of several materials of properties identical in almost every way, but with slightly different atomic weights. From consideration of the periodic table it is possible to deduce the properties of any ele-

ment from those of its neighbors in the system. See such headings as ELEMENTS, ATOMIC THEORY, MOLECULES, as well as articles dealing with the various individual elements.

Four types of chemical reactions are recognized: (1) Combination between elements or compounds, as  $C + O_2 = CO_2$ , representing the combination of carbon with oxygen to form carbon dioxide in burning; (2) decomposition of an existing compound, as  $2HgO = 2Hg + O_2$ , representing the separation of mercuric oxide into its elements, mercury and oxygen; (3) double decomposition, as  $NaNO_3 + KCl = KNO_3 + NaCl$ , representing a reaction between sodium nitrate and potassium chloride under certain conditions to form potassium nitrate and sodium chloride; and (4) displacement, as  $AgNO_3 + Hg = HgNO_3 + Ag$ , where mercury replaces silver in silver nitrate. The first type is called synthesis, for simpler substances combine to build up more complex ones. The second corresponds to analysis, the taking apart of a complex into its simpler constituents. Some authors include a fifth type of reaction in which one element replaces another in a compound and at the same time combines with the atoms replaced as  $CH_4 + 2Cl_2 = CH_2Cl_2 + 2HCl$ . This they call substitution.

A few generalizations of the greatest practical importance have been reached within the past few decades regarding chemical reactions. By careful study of multitudes of chemical reactions it has been possible to discover much about the factors influencing them and this accumulated experience has enabled chemists to bring about many important reactions.

For the discovery of 'heavy water' which may revolutionize chemical research, the Nobel Prize for 1934 was awarded to Dr. Harold Clayton Urey of Columbia University, New York. Together with Dr. George M. Murphy and Dr. F. G. Brickwedde in 1931 Dr. Urey showed that the heavy isotope of hydrogen, called denterium, was present in ordinary hydrogen to the extent of one part in 5,000. When denterium is combined with oxygen the result is 'heavy water.' Chemically almost a twin of hydrogen, but physically composed of atoms each of which is twice the mass of a hydrogen atom, denterium has formed the basis of many experiments, as the heavy hydrogen nucleus is important for its simple structure. 'Heavy water' has been produced at Columbia by a new process. A surplus amount may be the cause of old

age according to some theorists. Its main interest at present is a cause of slowing life and a factor in the researches on cancer.

The principal factors influencing chemical action are: (1) Contact between reacting substances; (2) energy condition of the system; (3) relative masses of reacting substances; (4) temperature; (5) pressure; (6) catalysts. Contact between reacting substances is of the utmost importance in any chemical reaction. Between gases and between substances in solution, the activity of the moving molecules and the forces of diffusion tend to secure perfect mixing, and contact approaches the ideal. In solutions of electrolytes, the division of molecules, themselves without electrical charges, into charged ions which are avidly seeking to neutralize their charges, provides an even greater probability of the desired contact. Reactions between solids and gases, or between solids and liquids in which they are completely insoluble, may frequently be brought about readily by the interposition of a mutual solvent. The condition of the system must always be such that energy is degraded (in the thermodynamic sense) during its progress before a reaction will occur. There are two types of reactions generally recognized, those which release heat and those which absorb it. The first kind occur readily enough; indeed, sometimes too readily, as in the premature explosion of a charge of dynamite. The second type is only to be forced by supplying energy to it in one form or another. It is possible only at very high temperatures to cause the second reaction, so that the chemist must be prepared to supply energy to his systems in a variety of forms to secure the results desired.

The relative active masses of the substances present influence the chances of collision of reactive particles and hence the course of the reaction. Most chemical reactions have been found to be reversible, *i.e.* capable of proceeding in either direction, and such reactions reach a point of equilibrium depending upon the masses of the materials present. An equilibrium is reached when the speed in one direction is exactly equal to that in the other, and the speed in either direction depends primarily upon the concentrations of the reacting substances. This fact is expressed as the law of mass action: *The speed of chemical reaction is proportional to the molecular concentrations of reacting substances.* We may consider the reaction between chlorine and water. At the equilibrium point, these two speeds are equal

and by equating them we obtain an expression like this:

$$\frac{(\text{Cl}_2) \times (\text{H}_2\text{O})}{(\text{HCl}) \times (\text{HClO})} = \frac{k'}{k} = K. \quad \text{It}$$

other words, since  $K$  is a constant unrelated to concentration but typical of other factors involved, an increase or decrease in the molecular concentrations of any one of the four substances changes the concentrations of two others. If any one of the products of a reaction is removed from the system so completely that its molecular concentration is virtually zero, the reaction will proceed to completion. This occurs if one product is insoluble, either a gas or a solid. This law of mass action is universal in its application.

Changes of temperature affect the value of  $K$  in the equation just given and hence alter the equilibrium. Some reactions are much more affected by temperature than others.

The effect of pressure on reactions between gases is of great importance. If the products of a particular reaction occupy less volume than the substances from which they are formed, an increase of pressure favors the reaction and increases its speed. If the products of the reaction occupy greater volume than the original substances, a reduction of pressure increases the speed. The effect of catalysts on the course of chemical reactions is not well understood. The word catalyst is used to designate a substance whose presence affects the rate of a reaction into which it does not apparently enter. A little pure finely divided iron greatly increases the rate of formation of ammonia from hydrogen and nitrogen, but at the end the iron remains quite the same as it was at the beginning. A great number of materials thus affect the course of various chemical reactions. The study of the fundamental principles of chemical reaction such as those mentioned above comprises the particular field of *physical chemistry*. The application of these and other less general principles to the elements, except carbon, to the behavior of specific substances, and to their preparation and use, constitutes the field of *inorganic chemistry*. The study of the compounds of carbon, formerly believed to be produced only by the intervention of vital force, their preparation and use, forms the field of *organic chemistry*. These three principal divisions of the science of chemistry are merely convenient designations for the same kind of work carried out by the use of different kinds of tools. There is much more difference between the methods and apparatus employed

in the several divisions than in the method of thought or type of problems attacked.

A large part of the inorganic chemist's attention must be devoted to analysis, for, as a rule, inorganic compounds are readily prepared when once their composition is known. There are two methods of analysis ordinarily pursued: the first (qualitative analysis) reveals the kinds of constituents in a mixture or compound; the second (quantitative analysis) determines the quantities of the various constituents present. Just as the inorganic chemist depends upon the periodic table, the organic chemist depends upon what are called homologous series of compounds to bring his results in various fields of work into their proper relations with one another. The principal sources of organic compounds are living matter of one kind or another and its fossil remains, coal and petroleum. From wood and other plant fibres, cellulose, the basis of paper, artificial silk (rayon), smokeless powder, nitrocellulose lacquers, celluloid, etc., is derived. From coal, the whole group of aromatic compounds forming the bases of huge industries is obtained by the method of destructive distillation. A similar method decomposes wood into compounds of the aliphatic series. Petroleum supplies a great variety of aliphatic hydrocarbons which may serve as starting points for the synthesis of their valuable derivatives. Among processes still in the experimental stage are the manufacture of alcohol from corn cobs, xlose (sugar) from rice-hulls, fuel and gas from fawn waste, alpha cellulose from bagasse. A process for making starch from sweet potatoes has been financed by the FERA and a plant constructed at Laurel, Mississippi. Another is the replacement of metal machine parts by plastic synthetic materials such as bakelite. Natural gas is a prolific source of still others, and vegetable and animal matter generally yield countless others of the greatest value. Striking advances have been made by chemists in the petroleum industry during the depression years. New methods have been developed for recovery of the oil from the earth; corrosion problems have been solved. High anti-knock gasolines have been produced. Hydrogenation of petroleum has achieved noteworthy effects. In 1930, a 5,000-barrel 'per day unit commenced operation at Bayway, N. J.

The methods of organic chemistry are similar to those of inorganic chemistry in involving analysis and synthesis, and there is no scientific reason today for a distinction be-

tween inorganic and organic compounds except for convenience of classification. The number of so-called organic compounds which have been made in the laboratory passes the 100,000 mark. There is probably no better example of the value of applied science than the field of industrial chemistry.

The applications of chemistry to practical problems are so diverse that many specialists in almost every line of human endeavor are required to carry it through. There are more than 1,000 industrial research laboratories in the United States. Employment in branches of industrial chemistry has on the whole withstood the financial depression remarkably well. Such rapid progress has been made in synthetic organic products that it is now possible to supply almost all the chemicals consumed in American industry. There is a considerable concentration of chemical industries in New York, New Jersey, and Pennsylvania. One finds chemists who have specialized in the application of chemistry to agriculture, to food, to biology, to the cellulose industries (paper, textiles, rayon, etc), to dyes and dyeing, to fertilizers, to fuels, to leather and gelatin, to medicinal products, to paint and varnish, to petroleum, to rubber, to sanitation, and to almost every type of industry involving chemical changes of any kind. This includes, with very few exceptions, every industry, for all involve materials of one kind or another and these can be properly handled only by the application of a knowledge of their chemical characteristics and the effect of these on their physical properties. See also CHEMICAL ENGINEERING. The field of electrochemistry, dealing with the changes of composition of substances under the influence of the electric current, has developed with startling rapidity during recent years as our vast water powers have been put to work producing cheap electric current; thermochemistry, whose study is heat changes, has similarly advanced, and an almost independent profession of chemical engineering has come into being for the study of industrial chemical problems involving both chemistry and engineering, but distinct from either. The chemical industry today ranks among the first five American industries in value of products. It includes the manufacture of chemicals, coal tar products, coke, salt, druggists' preparations, patent medicines, cosmetics and perfumes, essential oils, explosives, fertilizers, manufactured gas, dyestuffs, paints and varnishes, soap, turpentine, and resin, as well as petroleum refining and wood distilla-

tion. See the articles on these various products.

*Physiological Chemistry*, or *Biochemistry*, is the division of applied chemistry in which are considered the chemical transformations occurring in the vital phenomena of animals and plants. The scope of physiological chemistry embraces the study of the constitution of foodstuffs; the manner in which digestive processes render them assimilable; the elaboration from the products of digestion of those complex substances characteristic of the living organism, and their subsequent resolution and elimination, the whole cycle forming the animal or vegetable 'metabolism.' In these changes an important rôle is that of the enzymes, or unorganized ferments, secreted by the cells of the digestive organs, which act as catalysts.

Knowledge of the physico-chemical action of drugs and poisons renders medicine, so far as it is concerned with the administration of drugs, more rational and less empirical. The fields of *pharmacology*, the study of the effects of drugs, and of *chemotherapy*, the application of chemical compounds to the cure of diseases, have shown marked progress in the recent past.

The problem of increasing agricultural yields from arable areas to keep pace with increasing population and of getting the greatest good from the products of agriculture, whether in the form of food or otherwise, is the object of study of *agricultural chemistry*. Many little-known processes for the industrial utilization of farm products have been recently developed by research chemists of the United States Department of Agriculture. In the future it may well be possible that the raw materials of the chemical factories may come from farms rather than mines, wells, etc. Rather than producing food exclusively, the farm of the future must devote a major part of its crops to materials from which will be made by synthetic chemistry clothing, fuel, structural and building materials. See Hale's *THE FARM CHEMURGIC* (1934).

*Sanitary Chemistry* needs to be touched on but briefly here, as it is treated in detail under SANITARY SCIENCE.

*Chemical Warfare*, as introduced in the Great War, in violation of international treaties, sought to cause casualties and to reduce the efficiency of military man power by polluting the atmosphere and ground around troops. Several types of such weapons were used, poisons, to produce death; vesicants, to produce blisters and discomfort; sternutatories, to produce sneezing and cough-

ing; lachrymators, to produce blinding tears; and both toxic and non-toxic screening smokes. Both the methods of offense and of defence are being applied to many problems of peace; the former to the eradication of insect and rodent pests, and the latter to the protection of workers exposed to toxic atmospheres, as miners, firemen, etc. Thus far there is no authentic report of the use of poison gas by any combatant in World War II. Among other new chemical processes of commercial importance may be mentioned fixed nitrogen directly from the air, and producing synthetic ammonia from hydrogen. In peace, the process is being developed to make soil fertility possible by extracting necessary substances from the air for the benefit of agriculture.

In connection with this article should be read the articles ATOM and ATOMIC THEORY; ANALYSIS, CHEMICAL; ANALYSIS, COMMERCIAL; ELECTRO-CHEMISTRY; ELECTROLYSIS; ORGANIC CHEMISTRY; PERIODIC LAW; PHOTOCHEMISTRY; RADIO-ACTIVITY; STEREO-CHEMISTRY; THERMO-CHEMISTRY.

*Bibliography.*—The following titles have been selected as being directed to the general reader: Watt's *Dictionary of Chemistry*; Hood and Carpenter's *Text-book of Practical Chemistry*; A. F. Holleman's *Text-books of Inorganic Chemistry*; Thorpe's *Dictionary of Applied Chemistry*; Slonson's *Creative Chemistry*; Haldane's *Daedalus, or Science and the Future*; Howe's *Chemistry in Industry*; Tilden's *Famous Chemists, The Men and their Work*; Darrow's *The Story of Chemistry*; Thomson's *History of Chemistry*; Hale's *The Farm Chemurgic*.

Among the leading periodicals in America devoted to the subject of chemistry are *The Journal of the American Chemical Society*, devoted to pure science; *Industrial and Engineering Chemistry*, devoted to applied science; *Chemical Abstracts*, a survey of world literature in chemistry; *Chemical Reviews*, a quarterly of pure chemistry; the *Journal of Chemical Education*, devoted to material of interest to teachers and pupils; the *Journal of Physical Chemistry*, devoted to this branch of the science, and two series of monographs. All publications of the American Chemical Society, covering most fields of chemical activity in the United States. In addition to these *Chemical and Metallurgical Engineering*, a privately published journal devoted to the industry of chemistry, and the *Transactions of the American Electrochemical Society* and of the American Institute of Chemical Engineers

contribute special treatments of various types of research.

**Chemistry, Progress in.** Under the urgency of World War II, advances in chemistry were made that point toward vast expectancies for the post-war world.

Buna S became the most promising of the numerous rubber substitutes proposed for U. S. use. As a tire rubber, Buna S—made of the two basic materials hydrocarbon butadiene and the aromatic coal-tar derivative styrene—rates high, since it has an estimated 90 per cent of the wearing qualities of crude rubber. Butadiene is closely related to the compound butane, which occurs in natural gas. It can be produced in various ways, but in the U. S. is produced preferably from petroleum.

Plastics in endless variety and for thousands of civilian as well as war uses have been and are being created and perfected. These materials are invaluable both as substitutes and for new and special application.

The years 1942 and 1943 were years of great activity in the textile industry, and textile fibres from the chemical vats increased in variety. The stoppage of silk imports from Japan, 1941, created a shortage that, it was thought, would be adjusted by the use of Nylon. But after Pearl Harbor, all Nylon production was diverted to military uses—parachutes, tow ropes, bomber tire fabrics, weather-resistant shoe laces, etc. Lucite, another du Pont development, a transparent synthetic resin noted for its crystal clarity, also went to war. These two soldiers of science, it is said, will perform after the war jobs that outdo the imagination.

The exigencies of the war also ushered in the era of light metals. The year 1942 saw a seven-fold increase over 1939 in aluminum production and a hundred-fold increase in magnesium production. In the production of magnesium, the enormous hydroelectric power of the Far West and of the great Sageunay River project was utilized.

Petroleum was utilized as a raw chemical for numerous large-tonnage chemical products, among them soap, rubber, plastics.

Consult Hessel and Martin's *Chemistry in Warfare* (1942); also articles in *Science*; *Chemical and Engineering News*; *Textile World*.

**Chemistry, U. S. Bureau of,** a section of the Department of Agriculture established as the Division of Chemistry in 1862, and changed in 1901 to the Bureau of Chemistry. Its work is concerned with analysis and in-

vestigations under the Pure Food and Drugs Law and other chemical investigation referred to it by the Government.

**Chemkend.** See **Chimkent**.

**Chemnitz,** town, Germany, in the district of Zwickau, Saxony. Notable public buildings include the Church of St. James, fifteenth century; old Rathaus. It is the chief manufacturing town of the kingdom, and one of the principal manufacturing towns of the German empire. Its specialties are the production of knit goods, locomotives and machinery, agricultural implements, and tools. The town is surrounded by a close ring of industrial villages and is splendidly equipped with special technical schools; p. 331,650.

**Chemnitz, Martin** (1522-86), eminent Lutheran theologian was born at Treuenbrietzen in Brandenburg, Germany. Along with Andrea and Selnecker he induced the Lutherans of Saxony and Swabia to unite in adopting the *Formula Concordia*. His works include: *Examen Concilii Tridentini*; *Corpus Doctrinae Pruthenicum*; *De Duabus Naturis in Christo*. Consult his *Life* by Pressel, by Lentz, and by Hachfeld.

**Chemosh,** the national deity of the Moabites. He was essentially one with the Moloch or Milcom ('king') of the Ammonites, and both were forms of the Canaanite Baal.

**Chemotherapy,** a form of treatment in which a chemical substance is injected into the blood in order to destroy parasitic germs. See **VACCINE THERAPY**; **SALVARSAN**.

**Chempulpo,** town, on the west coast of Korea. It is one of the three treaty ports opened in 1883 to foreign commerce. At the outset of the Russo-Japanese War the Japanese landed here on Feb. 8, 1904; p. 100,300.

**Chemung Formation,** in geology, belongs to the Upper Devonian rocks of North America, and contains a great series of shales and ripple-marked sandstones in Pa., N. Y., and the Mississippi Valley. The Portage and Catskill groups are subdivisions of the Chemung. It is the chief source of oil and gas in Pennsylvania (see **PETROLEUM**). See **DEVONIAN**.

**Chemurgy,** the science that explores and promotes industrial use of agricultural products, as peanuts, soybeans, rubber, etc.

**Chenab,** or **Chenab,** one of the 'five rivers' of the Punjab, India; a tributary of the Indus. Its length is 755 m. The *Chenab Canal* is the largest and most profitable perennial canal in India.

**Chenery, Thomas** (1862-84), Eng. journalist, Orientalist; Arabic professor, Oxford; member revision committee of Old Testament.



**Cheney, Charles Edward** (1836-1916), American bishop. He became president of the synod of Reformed Episcopal churches of the Central States. He published: *The Second Norman Conquest of England* (1907); *A Belated Plantagenet* (1913).

**Cheney, Edna Dow** (1824-1904), American author. She took an active interest in woman's suffrage. She published: *Handbook for American Citizens; Life, Letters, and Journals of Louisa M. Alcott* (1889); *Stories of the Olden Time* (1890).

**Cheney, John Vance** (1848-1922), American poet and librarian. He published many books of verse and two volumes of essays, *The Golden Guess* (1892) and *That Dome in Air* (1895).

**Cheney, Seth Wells** (1810-56), American artist. His works include portraits of *Theodore Parker with His Wife*; *The President of Harvard*, James Walker; William Cullen Bryant; Ephraim Peabody; *A Roman Girl*.

**Cheng-tu-fu**, (Marco Polo's *Sindafu*), city, capital of Sze-chuen province, China. It has a large trade, chiefly with Tibet; p. 400,000.

**Chénier, André Marie de** (1762-94), French poet. His *Avis aux Français sur leurs Véritables Ennemis* (1790), and his subsequent writings, preaching moderation, earned for him the hatred of the Jacobins, and he was guillotined July 25, 1794.

**Chénier, Marie-Joseph de** (1764-1811), younger brother of the above. He was the author of several tragedies, and of the famous song *Chant du Départ*.

**Chenille**, a thick velvety-looking cord of silk or wool.

**Chennault, Claire Lee** (1881- ), Am. Major General, was born in Louisiana. He was a First Lieutenant in the Air Corps after World War I and when retired in 1937 became Chiang Kai-shek's air adviser and head of the Flying Tigers, an American volunteer group; Brig. General, 1942; Major General, 1943, commanding the 14th U. S. Air Force; resigned 1945. See Robert B. Hotz, *With General Chennault, The Story of the Flying Tigers*, 1943.

**Chenonceaux**, village, department Indre-et-Loire, France. It owes its interest to its Renaissance castle, which was built in the time of Francis I.

**Chenopodiaceæ**, an order of apetalous dicotyledons usually regarded as reduced types of Caryophyllaceæ, and closely related to Amaranthaceæ, with which some include them as Oleraceæ. There are about five hundred spe-

cies, mostly wood-like, and growing in arid or alkaline soils, and some of them on sea beaches. Beet and spinach are among the best known and most useful plants of the order. The genus *Atriplex* usually grows in saline localities. *Salicornia* is a salad plant, and the Greasewood is a fuel plant in desert regions. The Russian thistle is a pernicious weed in cultivated ground.

**Chenopodium**, a genus of plants belonging to the order Chenopodiaceæ. Some of the common species, known by the name of Goosefoot, are weeds growing in gardens, on heaps of rubbish, and in waste places. The leaves of many species are used as a substitute for spinach, particularly those of the Good Harry, Wild Spinach, All Good, or English Mercury. One of the most important of the species, as affording a leading article of food in the countries of which it is a native, is *Quinoa*. *C. Botrys*, is a native of the south of Europe. The closely allied Wormseed of the United States has a strong and somewhat aromatic odor. The 'Worm-seed' is *C. anthelminticum*; 'Mexican tea' is the tropical *C. ambrosiodes*. For *C. quinoa* see QUINOA.

**Chenoweth, Alexander Crawford** (1849-1922), an American engineer, born in Baltimore, Md. In 1884 he prepared the foundation for the Bartholdi Statue of Liberty, New York. In 1895 he took charge of construction work for the United States Government at Sandy Hook. He invented the Chenoweth steel-concrete pile and the Chenoweth reinforced concrete revetment. He was regarded as an authority on foundation work and was awarded several medals.

**Cheops, Khufu, or Chufu** (3733-3666 B.C., according to Brugsch), king of Memphis in Egypt, being the second monarch of the Fourth Dynasty. He built the first, or Great Pyramid, as a sepulchre for himself and left various other monuments bearing his name.

**Cephren, or Khefren**, a king of Egypt about 3666 B.C., who is said to have built the second pyramid. According to Egyptian tradition he was either the son or the son-in-law of Cheops, and the Sphinx has been attributed to him by some authorities.

**Cher**, department, Central France. Wheat, oats, and the vine are cultivated; but iron-mining is the chief industry; p. 323,000.

**Cher**, river, France, rises in the department of Creuse. It is navigable for boats from Vierzon.

**Cherbourg**, (anc. *Coriallum*), important

seaport, France, in the department of Manche. There are two ports, the commercial and the naval. The roadstead is strongly protected by forts. The breakwater was begun in 1783, and completed in 1858. Besides being a packet station for Havre, Guernsey, and Southampton, Cherbourg is a calling station for many of the transatlantic liners. The exports, especially to Great Britain, include dairy and agricultural produce and stone for road-making. In 1758 the British destroyed the fortifications, and on June 19, 1864, off the coast, the U. S. S. *Kearsarge* met and destroyed the Confederate cruiser *Alabama*; p. 38,281.

**Cherbuliez**, family of French writers the most famous of whom is VICTOR (1829-99), son of André Cherbuliez, a professor of classical literature at Geneva, where he was born. His best novel, *Samuel Grohl et Cie* (1877), was crowned by the French Academy.

**Cherethites, The, and The Pelethites**, two tribes in Palestine who formed King David's bodyguard.

**Cheribon**, seaport town, Java, capital of the residency of Cheribon. It has considerable trade in indigo, coffee and teakwood; p. 23,500.

**Cherimoya**, a delicious subtropical fruit borne by an evergreen tree or shrub, *Annona cherimolia*, which is a native of Ecuador and Peru. The fruit is green or yellowish, with a rosy cheek, irregularly round in shape, and its skin is tough and checkered by somewhat raised lines. The interior is a white, juicy, soft pulp, in which black seeds are imbedded. Its flavor is subacid, somewhat similar to a pineapple or banana.

**Chernigov, or Tchernigov**, government of the Ukraine, Russia. Agriculture and grazing are important; p. 2,500,000.

**Chernigov** (Polish *Czernichow*), town and archiepiscopal see of the Ukraine, capital of government of Chernigov. A feature of interest is the Cathedral of the Saviour, built in 1034 in Byzantine style and restored by Catherine II. one of the most famous monuments of East Slavonic church architecture. p. 34,000.

**Cherokee Cases**, the name by which two cases concerning the Cherokee Indians, which were decided by the United States Supreme Court in 1831 and 1832, are sometimes known, the actual titles being *The Cherokee Nation vs. Georgia* and *Worcester vs. Georgia*. In 1802 the United States agreed with Georgia to extinguish Indian land-titles in the State as soon as possible. In 1830, Georgia having

seized certain Cherokee lands, the Cherokee Nation appealed to the United States Supreme Court, which in 1831 decided that the Cherokees were not an independent but a dependent nation and therefore incapable of maintaining an action in the Supreme Court. This decision seemed to give Georgia a free hand, but in the case of *Worcester vs. Georgia* the court held that the United States Indian treaties were paramount to State Laws, and that State laws passed in contravention of these treaties were null and void. The decision was not enforced.

**Cherokees** (properly *Tsalaki*), a tribe of North-American Indians of the Appalachian stock. About 1780 they were driven south to the Carolinas and Georgia, where they formed a powerful confederacy and developed a well-organized political system, with national assemblies, and laws based on tribal usages. They turned their attention to letters about 1829, when Sequoya, better known as George Guess, invented a syllabary of seventy-eight signs, which adequately expresses the sounds of the Cherokee language, and is still in use. But the whole nation was removed in 1838 to Indian Territory, now Oklahoma.

**Cherry**, a small stone-fruit of considerable economic importance, found in almost all parts of the temperate zone. Most of the garden varieties are believed to have been derived from *Prunus avium* and *Prunus cerasus*, both natives of Europe, the cultivated sweet cherries, such as the bigarreaus and hearts,



Cherry.

1, Flower, petals and part of calyx removed; 2, fruit.

being descended from the first named, and the sour varieties, such as the Morellos and Amarelles, from the latter.

Good varieties of cherry are the Black Tar-

tarian, Napoleon and Dukes, both light and dark in color, and sweet in flavor. The Amarells, such as the Early Richmond, are light-colored, sour cherries and the darker-hued Morellos, such as the English Morello, are equally tart and excellent for canning and in preserves.

The cultivated varieties of the cherry are numerous, and differ in size, color, and flavor. The fruit is largely eaten fresh, and as an ingredient in preserves, and is used for making liqueurs, notably Cherry brandy. There are several native species of cherry which are little used, such as the sand-cherries (*Prunus pumila*), and the wild red, or bird cherry (*P. Pennsylvanica*). The choke-cherry (*P. Virginiana*) adorns rocky ledges, with its spreading bushes. The most important tree, from an economic standpoint is the wild black cherry, which sometimes reaches a height of nearly 100 ft. and has a trunk 4 ft. in diameter. Its wood is hard and strong, and, when polished, is of a rich red color. When sufficiently abundant it is a favorite wood for cabinet making. The bark is rich in tannin, and is used as a tonic, sedative and pectoral.

**Cherry-bird.** See **Cedar-bird.**

**Cherry Valley Massacre**, on Nov. 11, 1778, during the American Revolution, when about 800 Tories and Indians under Walter Butler and Joseph Brant, slew about 50 of the inhabitant of the village of Cherry Valley. In addition, 70 prisoners were taken, and these were treated with the greatest cruelty by their captors.

**Cherso**, an island in the Adriatic belonging to Jugo-Slavia. Wine and fruits are the chief products; p. 10,333, of whom about one-half are in the chief town, Cherso; p. 5,800.

**Chersonesus**, a Greek word meaning a peninsula. The **THRACIAN CHERSONESE**, the narrow strip of land between the Hellespont and the Gulf of Melas in Thrace; in the 4th century B.C. was dependent on Athens. The **TAURIC CHERSONESE**, now the Crimea, was colonized at an early date by Greeks from Miletus. **CIMBRIC**, equivalent to the modern Jutland and Schleswig-Holstein, acquires the name from the Cimbri, who inhabited it down to the 2nd century B.C. **GOLDEN**, a name given to the Malay Peninsula.

**Chert**, a variety of quartz very similar to flint, but coarser and less uniform in color and texture, and found principally in association with limestones. It appears to have resulted from the solution and redeposition of the silica of certain kinds of fossils, particularly of sponges, with the pointed spicules of

which it is often filled. This material was much used in the manufacture of implements by prehistoric tribes, for which purpose it is a good substitute for true flint.

**Chertsey**, mkt. tn. in Surrey, England. The school of handicrafts was founded in 1885 by Dr. Hawksley. A 'cherry' fair, held annually, dates from the time of Henry VI; p. 13,819.

**Cherubim**, one of four classes of angelic beings pictured as serving the throne of God. Mention occurs in four classes of biblical literature; in the account of the Fall, in early poetry, in apocalyptic prophecy, and in descriptions of furniture and adornments of the temple. On the veil which separated the Most Holy Place from the Holy Place in the Tabernacle were inwrought figures of cherubim, probably as guardians. In Solomon's temple in the Holy of Holies were colossal figures fifteen ft. high and with a spread of wings of fifteen ft. And they were introduced as elements of the adornment of other parts of the temple. From the negative descriptions given the form seems to have been imaginary, not that of man or of any known animal. Composite figures in ethnic belief are often created to express amplitude of power or excellency. The motif was probably found either in Phœnicia or in Assyria; the former had winged griffins, the latter the well-known colossi which guarded the gates of palaces.

In late Jewish theology the cherubim are among the highest of the orders of angels. The early background of the conception is the animism of primitive belief; the development was conditioned by surrounding developments. See Schultz's *O. T. Theology* (1892), and the works of Nowack and Benzinger on Hebrew Archaeology.

**Cherubini, Maria Luigi Carlos Zenobio Salvatore** (1760-1842), Italian musical composer. Some writers divide Cherubini's work into three periods. The first, from about 1779, consists of motets and masses written after the manner of Palestrina, and light operas in the Neapolitan style. The second or great operatic period, dating from the production of *Démophon* (1788), includes such works of importance as *Lodoiska* (1791), *Elisa* (1792), *Médée* (1797), and his operatic *chef-d'œuvre*, *Les Deux Journées* (1800). His last period, from about 1809, contains his famous sacred compositions, notably the *Requiem in C minor*, his greatest work. See his *Life* by E. Bellasis (1874); also that by Crowest (1890).

**Chéruei, Pierre Adolphe** (1809-91), French historian, born at Rouen. His principal

works, which are trustworthy and full of varied interest, are *Dictionnaire Historique des Institutions, Mœurs, et Coutûmes de la France*; *Histoire de France pendant la Minorité de Louis XIV.*, *Mémoires de Fouquet*.

**Cherusci**, an ancient German nation who dwelt on both banks of the Weser R., definitely checked the Roman conquest of Germany in 9 A.D.

**Chervil**. Two allied plants, belonging to the order Umbelliferae, with some culinary reputation for salads, garnishes, flavoring.

**Cherville, Gaspard Georges, Marquis de** (1821-98), collaborator of Dumas père, wrote independently a number of books on sport and country life.

**Chesapeake Bay**, a large inlet of the Atlantic Ocean in Virginia and Maryland. The headlands at the entrance, Cape Charles and Cape Henry, of the Virginia coast, are about 12 m. apart. Many large rivers enter this bay, mostly through broad estuaries. Upon it are situated the cities of Baltimore, Annapolis, Norfolk, Portsmouth, and Newport News, all having excellent harbors. The bay is famous for its oysters and wild fowl. Here a naval engagement took place on Sept. 5, 1781, between a French fleet, under Comte de Grasse, and the British. The battle was indecisive.

**Chesapeake, The**, a famous vessel of the U. S. navy, a frigate of 38 guns, built at Norfolk, Va., in 1799, and remembered chiefly because of the so-called 'Chesapeake outrage.' In April, 1807, three deserters from the British warship *Melampus*, all colored and all Americans by birth, two of whom had previously been impressed from an American vessel into the British service, were enlisted on board the *Chesapeake*. These deserters the U. S. refused to surrender, and on June 22 the *Chesapeake* was defeated on the high seas by the superior British war-ship *Leopard*. The outrage caused bitter indignation against England throughout the U. S., and it contributed greatly toward bringing on the War of 1812. During this war, on June 1, 1813, the *Chesapeake* was captured off Boston by the slightly superior British frigate *Shannon*. Capt. Lawrence, being mortally wounded, was carried below, crying out, 'Don't give up the ship.'

**Chesapeake Beds** are strata belonging to the Miocene of the Virginia-Maryland region about Chesapeake Bay.

**Cheselden, William** (1688-1752), English surgeon and anatomist. In 1723 he published a *Treatise on the High Operation for the Stone*, and in 1727 performed his lateral operation,

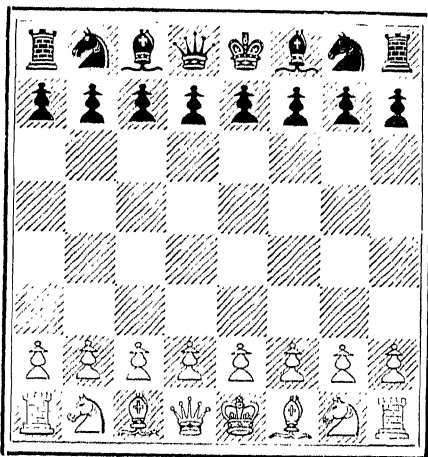
which marks a distinct advance in surgery; his *Osteographia, or the Anatomy of the Bones* is a splendidly and accurately illustrated work.

**Cheshire**, maritime co., in the n.w. of England, on the border of Wales. It is famous for cheese.

Henry III. conferred the earldom on his son Edward. Since then the title of Earl of Chester has usually been borne by the Prince of Wales; p. 689, 711.

**Chesney, Francis Rawdon** (1789-1872), British general and explorer. He drew up a report on the Isthmus of Suez which inspired De Lesseps's canal scheme; but his life's dream was to connect India with Europe, by an overland route, *via* the Euphrates. In this connection he made three expeditions and proved the navigability of the Euphrates. He wrote narratives of his *Expedition to the Euphrates and Tigris*. See *Life*, edited by Stanley Lane-Poole.

**Chess** is played by two persons on a board of 64 squares of alternate black and white, which is so placed between the players that a white square is on the extreme right of each. The 'men' played with number 32—16 black



Chess.

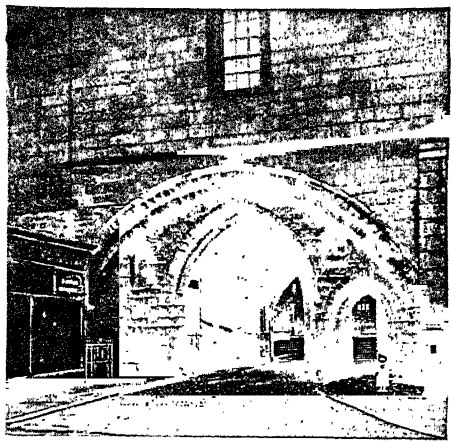
and 16 white. One player takes the black men, the other the white, each arranging his men on the side of the board nearest him in the manner shown in the diagram. They are made up on each side of a king (whose absolute arrest is the object of the game), a queen, 2 rooks or castles, 2 bishops, 2 knights, and 8 pawns. In the illustration may be seen the 8 pawns and, left to right, rook, knight, bishop, queen, king, bishop, knight, rook.

The king has the power of moving into any vacant square adjacent to the one he is occupying provided it is not commanded by one of the hostile pieces, but no farther. The queen may also move in any direction—forward, backward, laterally, diagonally—and as far as the player wishes to move her, subject, of course, to the line of her progress not being blocked by intervening pieces. The rook has the same sweeping power as the queen except that he cannot move diagonally. The bishop moves diagonally only, and backward or forward, any distance. The knight's move is a combination of the rook's shortest move, followed by the bishop's shortest move. Its power to move is not hindered by intervening pawns or pieces. The pawn moves

squares of the board are named from the pieces.

The abbreviations commonly occurring in chess are K for king; Q for queen; R, for rook; B, bishop; Kt, knight; K R, king's rook; Q R, queen's rook; K B, king's bishop; K Kt, king's knight; Q B, queen's bishop; Q Kt, queen's knight; P, pawn; Ch. check; Dis. Ch., discovered check; en pass., *en passant*; sq., square; O—O, castles; O—O—O, castles queen's side; !, a good move; ?, a bad move.

The king is never captured; when a piece or pawn attacks him, he is said to be in check, and the opposing player announces this by crying 'check.' The player of the attacked king must free him from check, either by moving him to an adjacent square not commanded



*Scenes in Chester.*

Left, Bishop Lloyd's House, Watergate Street. Right, Old Abbey Gate.

forward only, and not farther than 1 square at a time, except on being first moved, when it may be moved 1 or 2 squares as desired. A piece or another pawn directly in front of it stops its progress; but it can capture any piece or pawn in either of the adjacent squares in advance and diagonally to the right or left of it; and by so doing it is moved into the square previously held by the captured piece or pawn.

When a pawn reaches an 8th square in the adverse royal line, it may be promoted to any rank the player likes, except, of course, the rank of king—i.e. it may become a queen, a rook, a bishop or a knight, or it may remain a pawn.

According to chess notation in Britain, the

by an adverse piece or pawn, or by capturing the attacking piece, or by interposing a piece or pawn, and so screening him from the check. If none of these methods can be adopted, the king is 'checkmated,' and the player whose king he is loses the game. Sometimes it happens that a player has no other move on the board except moving the king into check; this is a 'stalemate,' and the game is drawn.

The king is allowed the privilege of 'castling' once in a game, a peculiar move performed in conjunction with either the king's rook or the queen's rook. In each case the rook is moved up to the king, and the king is moved over the rook to the square adjoining it laterally. This privilege is permissible only

when neither the king nor the rook has yet been moved, when no piece intervenes between the king and the rook, no square passed over by the king is commanded by a hostile piece, and the king is not in check.

Besides drawn games arising from stalemate, other draws occur, when there is not enough force to effect a mate. When neither side has any pawns left, the player with the weaker force often makes what is called the 50-move call—i.e. he calls on his adversary to mate him in 50 moves, failing which the game is drawn; but this he can lawfully do at any time. A *gambit* (Ital. *gambetto*, 'to trip up') is a kind of opening in which a pawn or a piece is sacrificed for the purpose of obtaining an attack. Some of the regular openings—and the opening of a game is all-important—are the king's knight's game, king's bishop's opening, king's gambit, queen's gambit, etc. to which there are recognized replies, such as, to king's knight's game, Philidor's defence, Petroff's defence.

The weight of authority leans in favor of India as being the birthplace of the game. Chess exactly as we play it now dates from the 16th century when 'castling', the latest change, was introduced. In the 18th century appeared Philidor, who was born at Dreux, near Paris (1726), and died in London (1795). He came to London in 1747, and tended to create an entirely new era in chess. James Mason, a player and chess writer of the first order, describes Philidor's *Analysis of Chess* (1749) as the chess *magnum opus* of the 18th century.

Though blindfold chess had been practised by Arabian and Persian players, it seems to have been unknown in England until Philidor played two games blindfold at the St. James's Chess Club. Paul Morphy is regarded as the greatest chess genius that has yet appeared. He was born in 1837 at New Orleans, and at the age of twenty-one won the first prize at the New York tournament of 1858. The modern school of players of the first magnitude includes Blackburne, Winawer, Mason, Tarrasch, Zukertort, Tchigorin, Lasker, Pillsbury, Janowsky, Schlechter, Maroczy, Marshall, Capablanca, Bogoljubok, Alekhin, Rubinstein.

Alexander Alekhine, chess champion of the world from since 1927, was born in Moscow and emigrated to Paris. He is a Doctor of Law at Paris University. He won more than twenty international tournaments, holds the world's record for blindfold chess, and has written many books on chess. At the Century

of Progress Exposition at Chicago, 1933, he played simultaneously 32 opponents, while blindfold—winning 19 games, drawing 9, and losing 4 in 12½ hours. Consult Lee and Gossip's *The Complete Chess Guide*; E. A. Greig's *One Hundred Pitfalls on the Chessboard*.

The outbreak of war in Europe, Sept. 1939, ended one of major chess tournaments of the 20th century, at Buenos Aires, when French and Polish teams withdrew rather than meet teams of hostile nations.

The first original English treatise on chess of any merit is by Captain Joseph Bertin—*The Noble Game of Chess* (1735). The most concise and, as far as it goes, the most reliable history is to be found in James Mason's *Social Chess* (1900). For students of the game as distinct from its history, there are works by the various players mentioned; and *Chess Theory and Practice*, edited by R. B. Wormald; Wormald's *Chess Openings*; Bird's *Chess Masterpieces*; Gossip's *Chess Player's Manual*; Freeborough and Ranken's *Chess Openings and Chess Endings*; Lee and Gossip's *The Complete Chess Guide*; and E. A. Greig's *One Hundred Pitfalls on the Chessboard*.

#### Chest. See Thorax.

**Chester**, city and episcopal see, municipal and parliamentary borough, and country town of Cheshire, England, is surrounded by ancient walls of red sandstone nearly 2 miles in circumference. It is famous for its old half-timbered houses, Roman antiquities, Cathedral, Bishop's Palace, Market place and general mediæval aspect.

The most unique feature of Chester is the arrangement of the houses on the main streets, forming the 'Rows.' These are covered arcades or galleries formed by the projection of the second stories of the buildings. The arcades are approached by flights of steps from below. The most important building is the Cathedral on a site originally occupied by a convent dedicated to St. Werburgh. The present building, erected in the 16th century and restored in the 19th, contains portions of the old abbey. The Lady Chapel is a beautiful specimen of Early English. The only remainder of the ancient Norman castle is the Julius Caesar Tower. Chester is the seat of the cathedral grammar school founded by Henry VIII., the blue-coat school (1700), and the green cap school for girls (1718). Chester was a Roman station for the 20th Legion, and after its departure, was in the hands of the British, Saxons, and Danes. It was the last English city to yield to William the Conqueror (1070).

who granted it to his nephew Hugh Lupus. In 1646, after a long siege, it was taken by the parliamentary forces. It is now a trade center; p. 40.794. Consult Omerod's *Cheshire*; Ducksworth's *Chester*; Fenwick's *Rare Old City of Chester and the River Dee*.

**Chester**, city, Pennsylvania, Delaware co., is the seat of the Pennsylvania Military Academy. The City Hall, built in 1724, and the house of William Penn are historically interesting. Chester is the oldest town in Pennsylvania. It was settled by the Swedes in 1643 and was at first known as Upland. It was the base of the Continental Army immediately after the battle of Brandywine; p. 59.285.

**Chester, Joseph Lemuel** (1821-82), American genealogist and antiquarian. He removed to London, England, and devoted himself to genealogical researches. He was one of the founders of the Harleian Society and his *Registers of Westminster* (1876) was one of its publications. He published numerous works.

**Chesterfield**, municipal borough and town in Derbyshire, England. The chief place of interest is the Parish Church (14-15th centuries), with a curiously twisted spire. There are large iron and steel works; p. 61.236.

**Chesterfield, Philip Dormer Stanhope**, Fourth Earl of (1694-1773), English author, was sent as ambassador to The Hague, 1728, and on his return was made Third High Steward. He was a bitter opponent of Walpole, and his share in the latter's downfall (1742) was large. In 1744 he assisted in driving Carteret from office and in 1745 was appointed lord-lieutenant of Ireland, which office he exchanged for the secretaryship of state (1746). He resigned his seals in 1748, and practically withdrew from public life. His tact, wit, and fine manners fascinated his contemporaries. His literary reputation rests on his *Letters* and the *Letters to his Son* (Philip Stanhope). Consult Austin Dobson's *Eighteenth Century Vignettes*; *Life* by Craig.

**Chesterfield Inlet**, a long, narrow arm of Hudson Bay.

**Chester Plays**, a series of 25 miracle plays, dealing with the Biblical story from the creation to the redemption, which were acted by guilds of Chester at Whitsuntide. The series dates from about 1400. See **MIRACLE PLAY**.

**Chesterton, Gilbert Keith** (1874-1936), English author and critic, contributing both prose and verse to periodicals and attracting attention by his vigorous reviews. He pub-

lished critical studies of Browning, Shaw, and others; piquant essays; poems; detective fiction; *Dr. Johnson*, a play; short stories. His fame as a versatile writer is equalled by his reputation as a wit, lecturer, and champion of numerous causes. He is considered in England a leading Roman Catholic writer and philosopher.

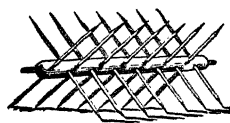
**Chestnut**, a handsome tree of the genus *Castanea*, belonging to the family *Fagacæ*. There are five species of the true chestnut, three of which are American. *Castanea dentata* is the best known and most important of the American species. Chestnut trees are of value commercially both for their wood and for their nuts. In Europe, particularly in Italy and Spain, they form an important part of the peasants' diet. *Marrons glacés*, candied chestnuts, are popular in both Europe and America. The *Chestnut Bark Disease*, produced by a parasitic fungus probably introduced from the Orient, has proved fatal to most of the American species in the U. S.

**Chesuncook Lake**, lake in Piscataquis co., Maine. The Penobscot River flows through it.

**Chetniks**, Yugoslavia's patriot army which fought in 1904 for freedom from Turkey. In World War II, under Gen. Draja Mihailovitch, it resisted the German invaders.

**Chettle, Henry** (?d. 1607), English dramatist and pamphleteer. From Henslowe's diary we know that Chettle was the author of 13 plays, but only one, the *Tragedy of Hoffman*, has come down to us. He edited Greene's *Groat's-worth of Wit*, and for the attack in it on Shakespeare (?) apologized in his *Kind-Hart's Dreame*. His *Englands Mourning Garment*, 1603, is interesting for its allusions to contemporary poets.

**Cheval de Frise**, (Fr. 'horse of Friesland'), in fortification, a machine composed of a piece of timber pierced and traversed with wooden spikes, pointed with iron and



*Cheval de Frise.*

used for defending a passage. It was called a 'horse of Friesland,' from having been first used by the Prince of Orange in the siege of Groningen, Friesland, in 1594.

**Chevalier**, originally a horseman, a knight, then a member of a knightly order; also the

title of younger sons of noble families in France.

**Chevalier, Albert** (1861-1923), English coster comedian and music-hall singer, was born in London, son of a French master at Kensington Grammar School. He wrote over a hundred sketches, monologues, and plays, and *Before I Forget* (1901), an autobiography.

**Chevalier, Maurice** (1899- ), actor, born near Paris, France. He began to sing in music halls at the age of eleven and was dancing partner of Mistinguett while still in his teens. He entered the French Army in 1913, was wounded in 1914 and spent 26 months in a German prison from which he escaped. He was awarded the Croix de Guerre. After the war, he starred in 'Hello, America' in London, appeared in French silent films, and came to this country in 1928, starting from that time on in films, among which are 'Innocents of Paris,' 'The Big Pond,' 'One Hour With You,' 'The Way to Love.'

**Chevalier, Michel** (1806-79), French economist and statesman, was born in Limoges. He joined the socialist school of Saint-Simon in 1829, became editor of their organ, the *Globe*. He was sent by the Government to the United States, later publishing the results of his observations in *Lettres sur l'Amérique du Nord*. He also wrote *Des Intérêts Matériels en France*. Joining hands with Richard Cobden he secured the famous commercial treaty, 1860, between France and England.

**Chevalier au Cygne, Le**, an ancient French romance. Consult *The Romance of the Chevalere Assigne*, edited for the Early English Text Society.

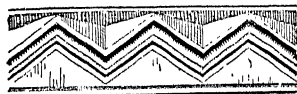
**Cheves, Langdon** (1776-1857), American lawyer, political leader, and financier. He joined with Henry Clay and John C. Calhoun in urging the declaration of war against Great Britain. He is best remembered for his services as president of the second U. S. Bank.

**Cheviot Hills**, a broad range of undulating grassy hills, extending nearly 30 m. along the Scottish border. The name is also applied to a range of hills nearly at right angles to the preceding.

**Chevreul, Michael Eugène**, (1786-1889), French chemist. In addition to making valuable studies on colors, he discovered margarine, oleine, and stearine in oils and fats.

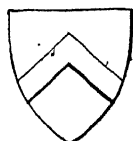
**Chevron**, a form of architectural decoration introduced into England in the 11th cen-

tury, and consisting of a 'zigzag outline' on the hitherto plain moulding of the Saxon and Early Norman arch. In heraldry, chevron is one of the ordinaries, issuing from dexter and sinister base, and meeting at honor point.



*Chevron (Architecture).*

**Chevrons**, on military or naval uniforms, are badges to denote rank, worn on either sleeve by non-commissioned officers and men. They are V-shaped and correspond in color to the trimming of the uniform appropriate to the branch of the service and vary from the single stripe of the lance-corporal to the three stripes with cross connecting arcs of the sergeant major. In the United States Army the chevrons are worn with the points up; in the Navy with the points down.



*Chevron, (Heraldry).*

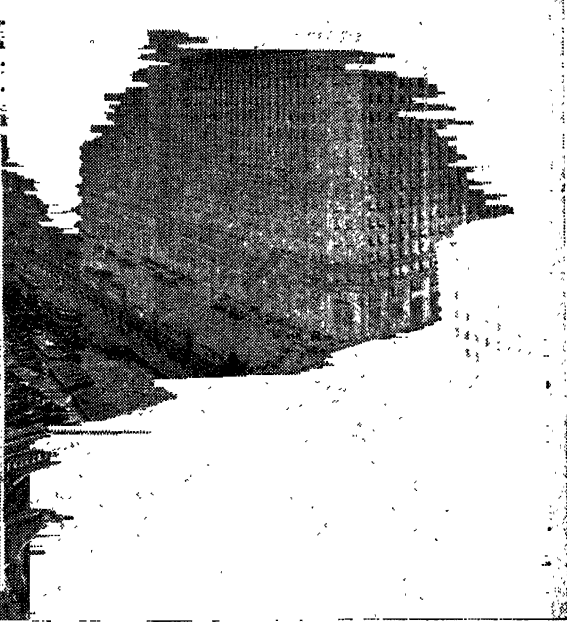
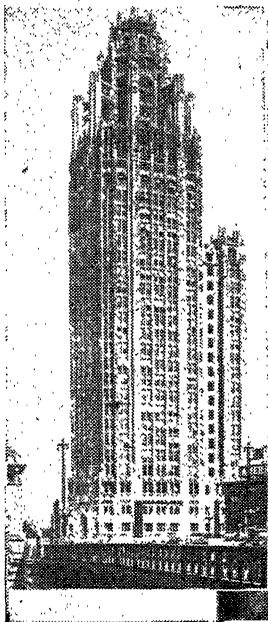
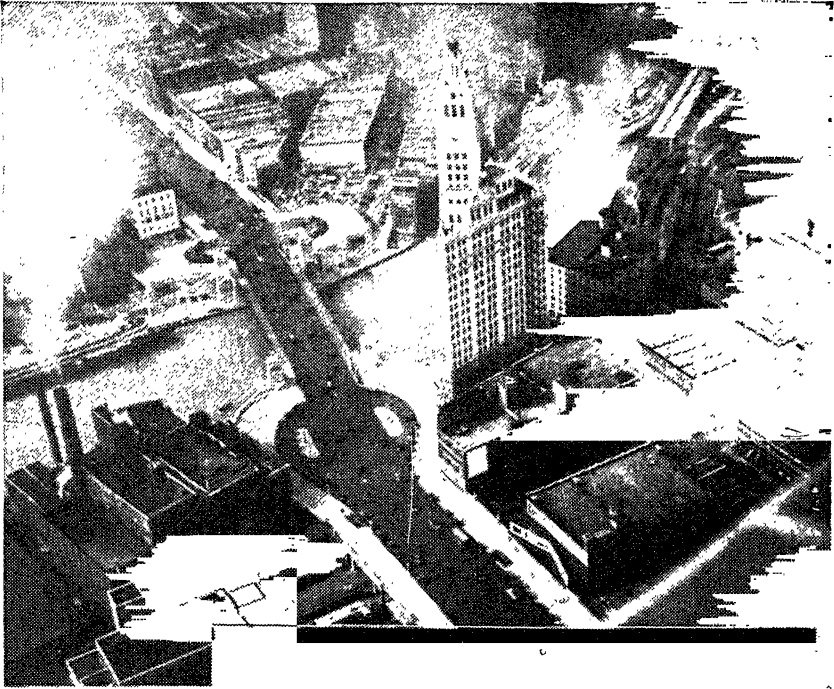
**Chevrotain, Deerlet, or Mouse Deer** (*Tragulidae*), a name applied to certain small artiodactyle ungulates, found in India and the Malay Peninsula and Archipelago. They are intermediate in structure between true deer and pigs.

**Chevy Chase**, a famous English ballad describing a Border combat between Hotspur, Earl of Northumberland, and the Scottish Earl of Douglas.

**Chew, Benjamin** (1722-1810), American jurist, son of an influential Maryland Quaker, Chief Justice of Pennsylvania, 1774. He sided against the Americans in the Revolution. His stone house at Germantown enabled a small party of British troops to delay the advance of the Americans.

**Chewing-gum**, a masticatory substance consisting either of a natural resin or gum-resin, such as that of the spruce, or, as is more common, of an artificial preparation of paraffine wax, flavoring matter, and other ingredients. Of late years chicle has been made the foundation of most chewing-gum and its





*Chicago Views.*

Top, Wrigley Building. Left, Tribune Building. Right, Merchandise Mart.

manufacture into that commodity, with the addition of sweetening and flavoring, has become a flourishing industry in the United States.

**Chewink**, or **Towhee**, a North American finch, especially the eastern towhee.

**Cheyenne**, river, South Dakota, branch of the Missouri.

**Cheyenne**, city, Wyoming, capital of the State and county seat of Laramie co., is situated at an elevation of over 6,000 ft., near the foot of the Rocky Mountains. Cheyenne is the center of an extensive cattle-raising industry. It has pressed-brick works, and stock-feeding yards; p. 22,474.

**Cheyennes**, a warlike tribe of North American Indians, a branch of the Algonquin family. The northern Cheyennes occupy a large reservation in Montana, in the Tongue River region, while the southern group is located in Oklahoma.

**Cheyne, Thomas Kelly** (1841-1915), English theologian, a pioneer in the teaching of modern Old Testament criticism. His published works include numerous Commentaries and *The Veil of Hebrew History*.

**Cheyne-Stokes Respiration**, so called from the physician who first described it, is a peculiar form of breathing, in which the respirations are at first very shallow, then gradually deeper, then cease entirely for, it may be, as long as half a minute. After the pause comes shallow breathing again, and the cycle is repeated.

**Chiabrera, Gabriello** (1552-1637), founder of the Italian Pindaric school of poetry.

**Chiana, Val di**, valley of Central Italy, traversed by the river Chiana (ancient Clanis), stretching from the Arno to the Tiber.

**Chiang Kai-shek** (1887- ), generalissimo of the Chinese armies and acting President of the free Republic of China, born Fenghua, Chekiang. On the outbreak of the Revolution in 1911, he returned to China and became secretary to Sun Yat-sen, succeeding him in 1926 as leader of the Kuomintang. In 1927 he withdrew from the Communist faction. In 1937 he led the army in the war with China, resigning in 1945 as Premier to give his attention to war but remaining President. He was present at the conference of the Allied leaders in Cairo in 1944. Following the surrender of Japan he succeeded in harmonizing the two factions in China.

**Chiang, Madame** (1898- ), wife of Chiang Kai-shek. She attended school in the U. S., being graduated from Wellesley College.

**Chiang-yin**, or **Kiang-yin**, fortified town, province of Kiang-su, China.

**Chianti**, mountain group of the Apennines. The vineyards supply the well-known red wine.

**Chiao-chou**. See **Kiao-chou**.

**Chiapas**, Pacific state, Mexico. It is mountainous, especially in the n. and the s.e., the chief peak being the active Tacana (13,940 ft.). Agriculture, stock and fruit growing flourish. Capital is Tuxtla; p. 442,683.

**Chiaroscuro**, a term used to express the use of light and shade in pictorial art, also applied to a method of printing wood engravings from several blocks.

**Chialtolite**, a variety of andalusite common in slates where they have been altered by the intrusion of a granitic mass or by metamorphism accomplishing complete recrystallization.

**Chiavari**, seaport town, Italy. Tourists visit Old Towers and Mount Penna. It lies amid low hills covered with vines and olive groves, and is famous for its chairs and lace; p. 12,500.

**Chiavenna**, (anc. *Glavenna*), town, Italy. It has a notable church, a castle (1620), and ruins of an ancient fortress, and is famous for its wine; p. 4,700.

**Chibchas**, or **Muisecas**, a linguistic family of South American Indians, highly civilized, whose domain at the time of the conquest comprised the Cundinamarca plateau and adjacent districts in Colombia. The Chibcha states were overthrown in 1538.

**Chica**, an orange-red pigment prepared from a native plant (*Bignonia chica*) by the Indians of the upper Orinoco and Rio Negro. Also a kind of beer made in South America.

**Chicago**, city, county seat of Cook co. Illinois, second city in the United States in population and commercial importance, is situated on the southwestern shore of Lake Michigan, and on the Chicago and Calumet Rivers, the Illinois and Michigan Canal, and the Chicago Drainage Canal, and at a mean elevation of 25 ft. above Lake Michigan and 582 ft. above the sea. The area of Chicago is 210 sq. m. New York City is distant 912 m., Boston 1,034, Washington 790, New Orleans 912 and San Francisco 2,274 m.

Chicago is the largest railroad center in the United States. The port of Chicago includes an outer harbor covering 1,300 acres, protected by breakwaters built by the Federal Government. Into this harbor has been constructed by the City of Chicago a municipal pier, known as the Navy Pier (cost \$5,000,-

ooo), the terminal for all lake passenger boat lines. The climate is equable. High temperatures are attained, but the heat is tempered by the lake breezes. The Chicago River and its branches divide the city into n., w., and s. sections. The business center of the city is largely in the southern division, in the section enclosed by the elevated railway 'Loop.' In common usage, 'the Loop' refers to a somewhat larger territory extending e. to Lake Michigan, n. and w. to the Chicago and its southern branch, and s. to Twelfth Street.

State and La Salle Streets, running n. and s., are respectively the department store center and the 'Wall Street' of Chicago. The most beautiful street is the famous Lake Shore Drive, 30 m. in length, leading to Fort Sheridan. The Cook County Court House and the City Hall, which occupy the square bounded by Clark, Randolph, LaSalle, and Washington Streets, were completed in 1907 and 1911. Other notable buildings are the Post Office and Federal Building, a Roman Corinthian structure; the highest building in the city is the Wrigley Building, on North Michigan Avenue; other notable buildings are the Marshall Field office building completed in 1932, the Tribune Tower, the Chicago Stadium, where the 1932 Republican, and 1932 and 1940 Democratic National Conventions were held, and the Post Office, completed in 1932.

**Parks.**—The extensive park system of Chicago aggregates about 8,000 acres, to which additions are constantly being made. Boulevards connect the 8 large parks, three of which, Lincoln, Humboldt and Washington, lie along the shore of Lake Michigan. The Adler planetarium (see ORRERY) in Grant Park was dedicated May 10, 1930. Its cost, \$1,000,000, was given by Max Adler of Chicago. The interior of the dome affords a realistic illusion of a view of the heavens unobstructed by clouds, with more than 4,500 planets, planetoids and stars in their orbital movements. The Shedd Aquarium, which opened June 1, 1930, also stands in Grant Park.

In the matter of halls the city is well supplied for the purpose of large gatherings, conventions, athletic contests and sports of all kinds. The largest of seating capacity is Soldiers' Field, an outdoor amphitheatre seating 120,000 people. Next in capacity is the Chicago Stadium, built in 1929 and seating 22,000. It is here that the National Political conventions are held when allotted to the

city. Next in capacity is the Coliseum seating approximately 15,000 persons. Of the theatres of large capacity the first is the Auditorium which seats 3,750 people. The Civic Opera House, which stands second, was built by a group of prominent Chicagoans as a permanent home for the Chicago Grand Opera Company which was formed in 1910. Orchestra Hall is next in size, being the home of the Chicago Symphony Orchestra.

**Libraries and Museums.**—Chicago has been the headquarters of the American Library Association since 1910, and has been termed the library center of the country. The Chicago Public Library contains about 2,000,000 volumes, and has many branches and sub-branches, as well as branch libraries in high schools. The Field Museum of Natural History has a library mostly relating to natural history subjects in the special fields of anthropology, botany, geology and zoology. Other large collections are the libraries of the University of Chicago; Northwestern University Library; Municipal Reference Library; the John Crerar Library; the Newberry Library, and the Chicago Historical Society Library.

The Field Museum of Natural History was founded in 1893 by Marshall Field who made an initial gift of \$1,000,000 for the purpose and later increased his contributions to \$9,430,000. The building is located in Grant Park. The museum ranks among the four leading scientific museums of the world. The Art Institute has collections of paintings, sculpture, etchings, engravings, textiles, Oriental art, antiquities, etc., which are considered among the finest in the country. The Academy of Sciences in Lincoln Park has a good collection of local natural history specimens and of molluscs. Seven m. s. of the center of the city are the beautiful buildings of the University of Chicago (see CHICAGO, UNIVERSITY OF). Northwestern University with its main buildings in Evanston, has in Chicago the Schools of Commerce, Law, Dentistry, and Pharmacy at Lake and Dearborn Streets, and the Medical School at Twenty-fifth and Dearborn Streets, with the affiliated Mercy and Wesley Hospitals and Calumet Avenue Dispensary. Under the administration of the Society of Jesus is Loyola University, with its academic department, St. Ignatius' College. The Chicago Academy of Fine Arts was founded in 1902.

Hull House, of which Miss Jane Addams was the President, located at 800 South Halsted Street, was the first American settlement.

being established in 1889. Its object is 'to provide a center for a higher civic and social life; to institute and maintain educational and philanthropic enterprises and to investigate and improve conditions in the industrial districts of Chicago.' Hull House and its influence has meant a great deal to Chicago and the Middle West. The public school system is administered by a board of education of eleven members appointed by the mayor, which elects the superintendent of schools.

The Cook County Hospital with its 3,300-bed capacity, is said to be the largest general hospital in the world. This institution includes the Psychopathic Hospital and Cook County Morgue. The Children's Department building cost \$1,000,000 and has a capacity of 500 beds. The group of institutions known as the Research and Educational Hospitals of the State of Illinois represents a most interesting effort toward the solution of problems involving medical education, public health and welfare as well as related social problems. The Albert Merritt Billings Hospital conducted by the University of Chicago Medical School, one of the most beautiful buildings on the University campus, is planned with the idea of meeting the requirements for research and education in medicine, and providing the best facilities for the care and treatment of patients.

The water supply of Chicago, which has been under municipal control since 1852, is obtained from Lake Michigan. The water near the shore being contaminated by sewage, a five-foot tunnel under the lake was built in 1864-65 to a water station, or crib, 2 m. out. Subsequent extensions of the system were made as demanded by the city's growth, and there are now 7 cribs, and 15 tunnels. The new experimental water filtration plant, located at 69th Street and Oglesby Avenue, is the largest and best equipped plant ever constructed for studying filtration problems. The purpose of the plant is to obtain data for the design of large filtration plants for Chicago. The leading feature of the sewerage system of Chicago is the Sanitary and Ship Canal (Drainage Canal). (See CHICAGO DRAINAGE CANAL.)

Chicago is the greatest municipal air transport center in the United States. It is the hub of the air mail service. More airplanes arrive and depart daily from the Municipal Airport than from any other airport in the country. No other large city in the United States is so near both the center of area and

the center of population as Chicago. Combined with this advantage, its situation at the head of the most southwestern of the Great Lakes, its extraordinary railway facilities, and its proximity to raw materials have made it one of the foremost commercial cities of the world. The project for a 'Lakes to the Gulf Waterway,' may still further increase Chicago's commerce. The seven leading industries are meat packing, foundry and machine-shop products; printing and publishing (book and job; newspapers and periodicals); iron and steel; men's clothing; and bread and other bakery products.

The Union Stock Yards are located at 42nd and Halsted Streets, about 6 m. from the center of the city. The 'Stock Yards' needs no introduction. They are situated on 500 acres of ground. About one-half of the space is given up to pens for livestock, the balance being occupied by the buildings of the packing companies. Over 15,500,000 head of cattle, calves, hogs, sheep and horses (for this is also a horse market) are received each year. The packing plants are open during working hours to visitors. The population of Chicago is 3,396,808, making Chicago the second city in the United States, and the 4th in the world. The negro population is over 200,000 and there is a large foreign-born population. Chicago is administered under a combination of authorities that has hampered municipal progress. Taxes are levied by the city, the county, the Board of Education, the three boards of park commissioners, the Sanitary District, and the Forest Preserve District. At the head of the municipal government is a mayor, elected for a four-year term. The common council of 50 members, one from each of the 50 wards, controls the excise, the police, the budget, and city contracts and city franchises, and confirms appointments by the mayor. The mayor appoints the heads of the city departments, and has the veto power; but ordinances may be passed over his veto by a two-thirds vote of the common council.

Marquette and Joliet both visited the site of Chicago in 1673. A treaty of Wayne with the Indians in 1795 secured the cession of six sq. m. of this territory to the United States. In 1803 a log house built about 1777 by a Santo Domingo negro was sold to John Kinzie, who thus became Chicago's first American settler; and in the same year a block house, called Fort Dearborn, was built. In the beginning of the War of 1812, Fort Dearborn was destroyed, and 52 (out of 70) of the garrison and their wives and children were

massacred by the Indians. Until 1830 the settlement was chiefly a military post and fur-trading station. It was incorporated as a town in 1833. In 1835 a treaty with the Indians, opening up a territory of 31,000 sq. m., attracted settlers, and growth was rapid, incorporation as a city taking place in 1837. The Illinois and Michigan Canal, begun in 1836, was completed in 1848, at a cost of \$6,170,226; and the latter year saw Chicago's first railroad.

Destructive fires visited the city in 1839, 1849, 1857, and 1871, the last being the greatest disaster in Chicago's history. In two years the city was rebuilt more solidly than before, and in 1875 it was incorporated under the Illinois Cities and Villages Act. In 1886 occurred the famous Haymarket Riots, when, upon the breaking up by the police of an anarchist meeting held during a strike of 40,000 workmen, a bomb was thrown, fatally injuring 8 policemen and wounding 66 others. The World's Fair, commemorating the discovery of America, was held in 1893 in Jackson Park (see *WORLD'S COLUMBIAN EXPOSITION*) and did much to stimulate the city's esthetic development. In 1903 the city celebrated the 100th anniversary of its settlement. Following the prohibition amendment to the Federal Constitution, Chicago attracted world-wide attention as a center for criminal gangs who exploited the liquor traffic and whose banditry and crimes brought into being the Chicago Crime Commission. The election of Anton J. Cermak (Democrat) as mayor in 1931 was a triumph for civic reform. He met death by an assassin's bullet intended for President-elect Franklin D. Roosevelt (Feb. 15, 1933). In 1931 the fight against crime in Chicago came to a head when 'public enemy No. 1' was sentenced to prison. By November of that year, 41 of the original list of 'public enemies' were dead, in prison, or in custody and six were fugitives.

The *Century of Progress Exposition* at Chicago, was designed to portray the history and development of arts, science and industry of the past hundred years. It was formally opened May 27, 1933, when a beam of light which started forty years ago from the star Arcturus was caught up at four observatories by photo-electric cells, amplified, and relayed to the fair, where at a given signal thousands of electric bulbs were lighted.

The classic buildings of previous exhibitions were replaced by buildings of architectural originality, designed in harmony with a modern, mechanical age. The principal

structures with one exception were windowless to demonstrate the usability of unvarying artificial illumination. The outer walls, made of pre-fabricated units bolted to steel frames, while presenting great unbroken plane surfaces, gained interest with their vivid color and marvellous illumination. Millions of incandescent lights, colored flood lights and miles of neon tubes transformed the  $3\frac{1}{2}$  m. of Lake Michigan shorefront into a fairyland of colored light at night. The important buildings included the Travel and Transport Building, circular in plan, its floor space free of columns, with a dome 125 ft. high and 200 ft. across suspended from mast like steel structures extending above the outer walls. Other notable structures were the Hall of Science, the Electrical Building and the General Exhibits Building.

More than \$38,000,000 was invested in preparation for the fair, and about \$5,000,000 was spent additionally by the exposition in running expenses each year. It was a financial success.

Chicago, in 1941, continued work on an extensive subway transit project begun in 1938, and financed partly by PWA funds. Mayor Edward J. Kelly was re-elected 1939.

Consult A. T. Andreas, *History of Chicago* (3 vols. 1884-86); J. M. and R. Ashenhurst, *All about Chicago* (1933); H. R. Hamilton, *Epic of Chicago* (1932); H. J. Smith and L. Lewis, *Chicago Centennial* (1933); C. S. Winslow, *Chicago, Past and Present* (1933).

**Chicago Drainage Canal**, a canal diverting the flow of the Chicago River from Lake Michigan, which is the source of the city's water supply, to the Mississippi, by way of the Des Plaines River. Until the construction of this canal, all the sewage of Chicago, which is emptied into the Chicago River, was carried on to the lake. The canal has a total length of 32 m. An act providing for the construction of the canal was passed in 1889 by the Ill. legislature, work was begun in 1892, and the canal opened in 1900. The works at Lockport consist of a bear-trap dam 160 ft. wide and 7 sluice gates 30 ft. wide. The horse power developed here is employed, by means of turbines, to light the city of Chicago. In 1910 the North Shore Channel by which the sewage of Evanston and the neighboring localities is conveyed into the Chicago River, was completed at a cost of \$4,143,000. In 1908 a special bond issue of \$20,000,000 was authorized by the State of Illinois for the construction of a nine-foot waterway from Lockport power house to Utica. This was

completed with the aid of the Federal government and opened for traffic in 1933. Under the River and Harbor Act of 1930, the Drainage Canal and Illinois waterway are linked up as a navigable waterway of the United States. Traffic was begun for barges and tugs from the Mississippi basin.

**Chicago River**, Illinois, is formed by a n. and s. branch joining in Chicago, 1 m. from Lake Michigan. The Chicago Drainage Canal which connects the s. fork with the Des Plaines River, reverses its current and diverts the city's sewage from the lake into the Mississippi through the Des Plaines and Illinois Rivers. The Illinois and Michigan Canal connects it directly with the Illinois River.

**Chicago, University of**, a co-educational institution of learning in Chicago, Ill., chartered in 1890, succeeding a former University of Chicago founded in 1857 and abandoned in 1886. Its organization was due largely to John D. Rockefeller, who made a subscription of \$600,000 toward an endowment fund, and whose gifts to the University have reached a total of more than \$35,000,000. The work of organizing the new institution was carried out by the American Baptist Education Society. In recognition of the prominent part taken by the Baptist denomination, the University charter provides that, although no religious tests shall be exacted either from professors or students, the president of the University and two-thirds of the trustees shall be members of Baptist churches. William Rainey Harper, immediately after the incorporation of the University, was made its first president.

The University was opened to students in 1892 on lands given by and purchased from Marshall Field. The original site included 17 acres—the central Quadrangles. These grounds have been increased to 100 acres, besides 70 acres at Williams Bay, Lake Geneva, Wisconsin, where the Yerkes Observatory (q.v.) is located. Most of the University buildings, some 90 in number, are on both sides of the Midway Plaisance between Washington and Jackson Parks, 6 m. s. of the center of Chicago. They are in the English collegiate Gothic style of architecture and are of remarkable beauty and harmony, being constructed according to the general plan of Henry Ives Cobb, who designed the buildings erected before 1900. Almost all of the buildings have been erected by private donations.

In 1930 a revision of the academic structure and educational programme was an-

nounced. The new organization consists of the College, four divisions in arts and sciences, and the professional schools. The College resembles a junior college and is separated from the four divisions, though dovetailing somewhat in their work. The purpose of the College is to make the student familiar with the great fields of knowledge, requiring the attention of the average student for about two years. Thereafter he may pursue advanced work toward a degree along some specific field of interest in one of the four divisions or in a professional school. The four divisions are: the biological sciences, the humanities, the physical sciences, and the social sciences. Grade-points, course-credits, etc., are regarded as artificial. The summer quarter brings together a large assemblage, many students of mature years, teachers, graduates, and college professors from all sections of the country and from foreign lands. The University Extension offers home study for students who are unable to attend.

The University Press is organized to do educational printing and publishing. Its scope includes the business management of the departmental journals, the publication of books and pamphlets, and the distribution of official documents. The libraries contain over 1,000,000 volumes.

**Chicane**, a system of petty tricks. In the game of bridge the word is used for the points which a player may score if he holds no trump cards.

**Chicas**, a South American Indian tribe of the Gran Chaco, Argentina, who differ in a marked degree from the other tribes (mostly predatory) of that region. They have fixed settlements, and cultivate the land in the Upper Bermejo district, where they were supposed to be *mitimaes*, or Peruvian colonists.

**Chichele**, or **Chicheley**, **Henry** (1362?-1443), archbishop of Canterbury, England, in reigns of Henry v. and Henry vi.

**Chichen**, **Chichenitza**, or **Chichen-Itza**, an ancient ruined city of Yucatan, Mexico, so-named from *Itza*, or *Itya*, a tribe of the great Mayan stock, and *Chechen*, well mouths, because the city was built round two natural pools or wells which supplied its natives with water. It is situated 25 m. w. of Valladolid and 100 m. s.e. of Merida. The history of the city is unknown. The ruins, which cover less than 1 sq. m., consist of some half dozen important piles, with numerous remains of inferior structures. One of the most important ruins is El Castillo, a pyramid-temple between 75 and 80 ft. high,

**Chichester**, city, municipal borough, and market town, Sussex, England; 61 m. s.w. of London. The Cathedral, erected in the 12th and 13th centuries, has a detached bell tower, or campanile (120 ft.), the only structure of the kind retained by an English Cathedral. It was partly destroyed in 491 by the South Saxons; was rebuilt by Cissa, their king. It was for some time the capital of the kingdom of Sussex. In December, 1642, the royalists of Chichester surrendered to the parliamentarians, under Waller; p. 13,911.

**Chi-Chou**, one of the nine divisions of China in the Hia or Hsia dynasty, 2205-1766 B.C., corresponding with West Chi-li, Shansi, and the part of Ho-nan n. of the Yellow r.

**Chickadee**, the black-capped titmouse. The chickadee is found mostly in the states from Delaware north to Maine and west into Pennsylvania. Several varieties are found in Western North America, both United States and Canada, and Eastern Asia.

The species varies in color in the various different climates for protection, its colorings seemingly fitting it to its surroundings.

See TITMOUSE.

**Chickahominy**, river, Virginia, a tributary of the James, which it joins 22 m. below City Point. Along its banks were fought, in 1862, the battles of Fair Oaks or Seven Pines, Mechanicsville, Gaines's Mill, Savage's Station, and Frazier's Farm or White Oak Swamp, and, in 1864, Cold Harbor.

**Chickamauga, Battle of**, a battle of the American Civil War, fought along Chickamauga Creek, near Chattanooga, Tenn., on Sept. 19-20, 1863, between about 57,000 Federals, the Army of the Cumberland, under General Rosecrans and about 70,000 Confederates under General Bragg. Rosecrans had maneuvered Bragg out of middle Tennessee, and on Sept. 9, without fighting a battle, had gained possession, as the result of a flanking movement, of Chattanooga. Bragg, reinforced, refused, however, to withdraw farther southward, and on Sept. 19 attacked Rosecrans. On the following day Bragg again attacked. About noon the withdrawal, through mistaken orders, of a division from the Federal line on the right of the center opened a gap, into which the Confederates poured, thus isolating the Federal right under General McCook, which, with the center under Crittenden, was soon overwhelmed, the Federals, accompanied by Rosecrans in person, being forced in dis-

orderly retreat back to Chattanooga. Thomas, though assailed by twice his number, stood firm, thus earning his sobriquet the 'Rock of Chickamauga,' and finally, without opposition and in good order, withdrew during the night to Rossville, the total result of the battle being an important victory for the Confederates. The Federal loss in killed, wounded, and missing was 16,179; that of the Confederates about 18,000.

**Chickamauga National Military Park**, a tract of land (15 sq. m.) in the southeastern part of Tennessee and the northwestern part of Georgia, embracing the battlefield of Chickamauga and the scenes of other actions of the Civil War around Chattanooga. It was established by Congress in 1890, with the co-operation of Georgia and Tennessee, and was dedicated September 19-20, 1895.

**Chickasaw Bluffs, Battle of**, a battle of the American Civil War, fought Dec. 29, 1862, at Chickasaw Bayou. The Federal attempt to gain possession of the bluffs at this point was repulsed. The Federal loss was nearly 2,000; the Confederate loss, nearly 200.

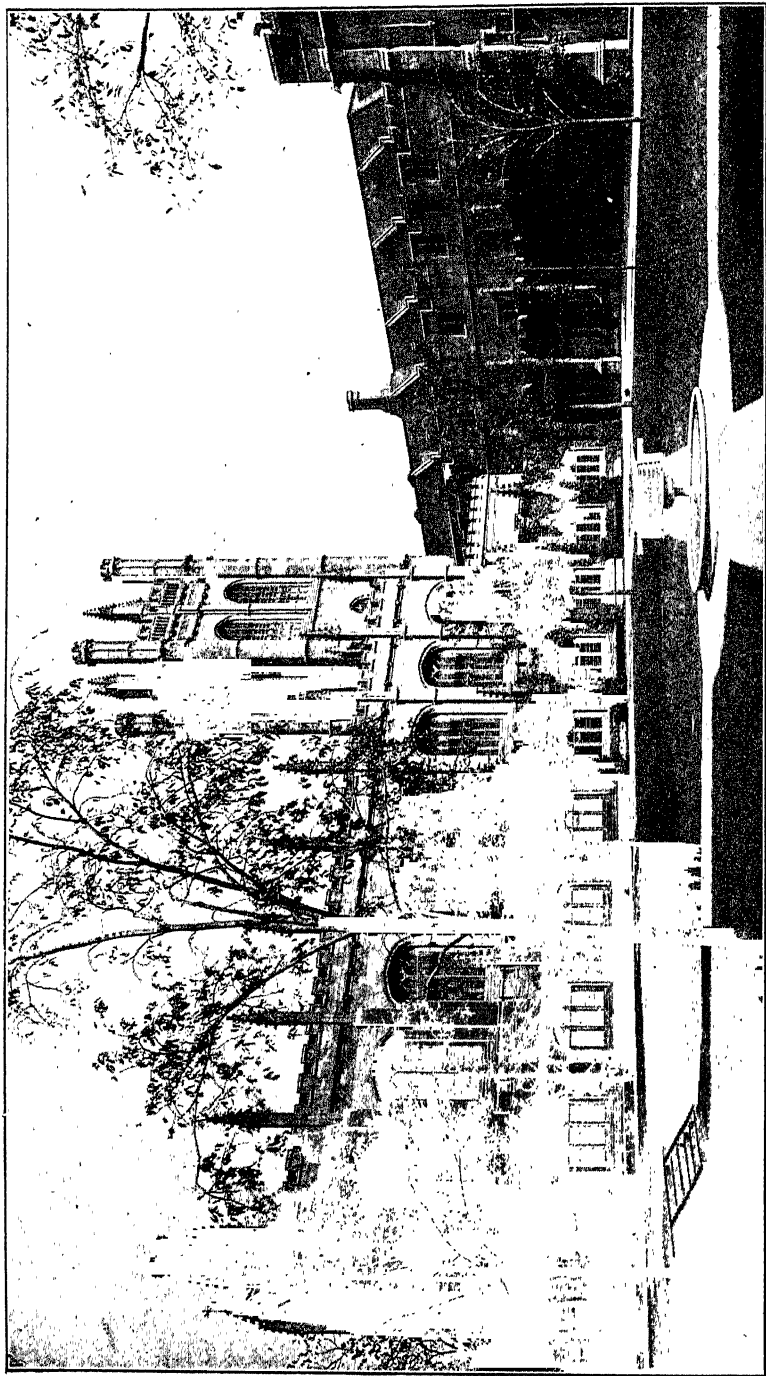
**Chickasaws**, a tribe of North American Indians akin to and former allies of the Choctaws. Their camping grounds stretched along the left bank of the Mississippi from a little s. of what is now Memphis to the confluence of the Ohio and the Tennessee. In 1834 they ceded their lands to the United States and settled in Oklahoma where they are known as the Chickasaw Nation.

**Chicken**. See Poultry.

**Chicken-pox** or **Varicella**, an acute, highly contagious disease, occurring chiefly in children, characterized by an eruption of vesicular type, appearing in crops and accompanied by mild febrile disturbance. The incubation period is variable—from a few days to three weeks.

**Chick Pea** (*Cicer arietinum*), an annual leguminous plant, native to the countries bordering on the Mediterranean. The seeds are ground into meal and form an important article of food in Spain, the Orient, and Eastern Asia.

**Chickweed**, a group of plants belonging to the order Caryophyllaceæ. The Common Chickweed (*Stellaria media*) is a hardy persistent weed found throughout most of the cooler parts of the world. It is used as a food for cagebirds. Other varieties of chickweed are Mouse-ear Chickweed (*Cerastium vulgatum*) and Field Mouse-ear Chickweed



UNIVERSITY OF CHICAGO: HUTCHINSON COURT AND MITCHELL TOWER



(*Cerastium arvense*), sometimes cultivated for its white starry flowers.

**Chicle**, a milky product obtained from the bark of the Sapodilla Plum or Bully Tree, from which chewing gum is made. The United States imports large quantities of chicle chiefly from Yucatan and British Honduras.

**Chicopee**, city, Massachusetts, Hampden co., at the confluence of the Chicopee River with the Connecticut River. 4 m. n. of Springfield. It is a thriving industrial town, deriving abundant waterpower from the Connecticut. There are large cotton mills, bronze works, and manufactures of boilers, hardware, firearms, etc. Chicopee was originally part of Springfield. It includes Fairview and Williamansett, and Chicopee Falls, which was the home of Edward Bellamy; p. 41,664.

**Chicory, Succory, or Endive** (*Cichorium intybus*), is a tough-stemmed composite plant usually growing about 2 ft. high, and commonly flowers on waste ground and by roadsides in summer. Its sky-blue flowers are only open during the hours of sunshine. Chicory



Chicory.

1, Floret; 2, fruit.

is grown for a salad by blanching the leaves of well-grown roots. Chicory is also extensively cultivated for its root, to be mixed with coffee. Although dissimilar in composition, in its action on the human organism chicory much resembles coffee. See Folkard's *Plant Lore, Legends and Lyrics* (1884).

**Chicoutimi**, tn., Quebec, Canada, county seat of Chicoutimi co., about 100 m. n. of

Quebec, on the Sagueney River. It is the seat of a college, is a Roman Catholic see and has a cathedral. Lumbering is the most important industry, and timber is exported directly, the river being navigable to large vessels; p. 9,500.

**Chief**, in heraldry, one of the nine 'ordinaries,' and defined as the uppermost 'third' of the shield defined by a horizontal line.

**Chiemsee**, a lake of Bavaria. On the largest of its three islands stands the palace of Herrenchiemsee, built by King Ludwig II., after the model of the palace of Versailles.

**Chieti**. (1.) Province of Central Italy, forming part of Abruzzi and Molise; embraces a relatively low, fertile coast belt, backed by a barren, mountainous region—the Abruzzi—which culminates in the steep Majella (9,170 ft.). Down to 1871 it was known as Abruzzo Citeriore. Area, 1,138 sq. m.; p. 385,300. (2) The ancient *Theatre Marucinarum*, archiepiscopal see of Italy, cap. of above prov., 8 m. s.w. of Pescara, on the Adriatic. It is a well-built town, with a cathedral of the 11th century, and ruins of a Roman amphitheatre and other structures, and also of a Norman castle. The monastic order of the Theatines was founded here in 1524; p. 29,500.

**Chiffchaff** (*Phylloscopus rufus*), a small European bird, olive-green above and white below. The name is due to the note, which is often heard in woods, lofty elms being specially favored by the bird, which is one of the warblers.

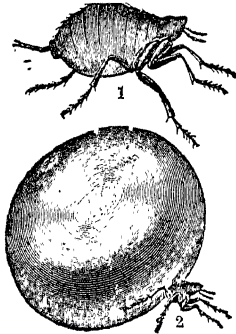
**Chi-fu**. See **Chefoo**.

**Chigi**, Agostino (1465-1520), Roman banker, and the friend and patron of artists during the age of Pope Leo X., more especially of Raphael, for whom he built the Villa Farnesina. The family of Chigi has furnished five cardinals, and a pope, FABIO (1911), who adopted the title Alexander VII. He is best remembered for his share in the Jansenist controversy, when he declared for papal infallibility on questions of doctrine; FLAVIO CHIGI (1810-85), cardinal, and papal nuncio at Munich (1850) and Paris (1861). Made cardinal in 1873.

**Chignecto**. (1.) Bay, forming the n.e. branch of the Bay of Fundy, between Nova Scotia and New Brunswick, Canada; it divides into Shepody Bay and Cumberland Basin. (2.) Isthmus between Chignecto Bay and Northumberland Strait.

**Chigoe, Jigger, or Sand-flea** (*Sarcophylla penetrans*), a parasitic insect native in tropical America, but now found in other

parts of the world. It attacks man, and while the male apparently does not differ in habits from other fleas, the female buries the anterior part of her body in the skin, and becomes enormously distended with eggs. The place of attack is usually the skin beneath the toes, so that children and persons who go barefoot are particularly liable to fall victims.



*Chigoes.*

1, Male; 2, female dilated with eggs.

**Chigwell**, par. and vil., Essex, England, on the Roding, 2 m. n.e. of Woodford. It is in the vicinity of Epping and Hainault Forests. Its 'King's Head Inn' figures in Dickens's *Barnaby Rudge* under the name of 'The Maypole.'

**Chih-li**, or **Chi-li** ('direct rule'), the metropolitan province of China, in many English maps called Pe-chi-li; bounded on the e. by the Gulf of Pe-chi-li and Manchuria, and on the n. by Mongolia. In 1914 the part of the province beyond the Great Wall was transferred to Inner Mongolia and Peking, now Peiping, and the country round formed into a separate district. Pao-ting-fu is the capital of the province and Tientsin and Chin-wang-tao are treaty ports. Area, about 50,000 sq. m.; p. about 30,000,000.

**Chihuahua**. (1.) State, Mexico, with New Mexico on the n. and Texas and Coahuila on the e. It is the largest state of Mexico, traversed in the s. and w. by ridges of the Sierra Madre, but has in the e. great tracts of desert. Its importance is due to its mineral wealth, its silver mines ranking at one time as the richest in Mexico. Gold and copper are also mined. Area 87,802 sq. m.; p. 421,700. (2.) Town, cap. of above, 225 m. s. of El Paso, is the center of a mining district. There are important woolen and cotton mills, and

stock-raising is carried on extensively. It has a magnificent cathedral, and its mint, established a few years ago, is now the third in the republic; p. 39,061.

**Chilblain**, or **Frostbite** (*Erythema pernio*), is an inflammatory condition of the skin, occurring principally in children and the aged, and more often in girls than boys. The commonest situations are the feet and hands, but chilblains may also be found on the ears and nose. They follow coldness of the part, and are therefore a winter affection, but some people suffer from them almost all through the year. A typical chilblain if severe and unchecked, passes through the stages of heat and itching, followed by a small blain or bleb, followed again by a breaking of the skin and a serous discharge. The itching is increased by warmth. The best preventive is to keep the extremities well clad in warm, loose gloves and boots, and, after exposure to cold, to restore circulation by gentle rubbing rather than by toasting at the fire.

**Child**. The most noteworthy features in the child's general conformation, as compared with the adult, are the large size of the head, the small size of the thorax, the large size of the abdomen, the shortness of the legs, and the length of the arms. These features are most pronounced in infancy, becoming gradually less with advancing years. The chief peculiarities of the skeleton depend upon the fact that it is a growing structure. The bones are more vascular than in the adult, and contain a larger proportion of organic material and a smaller percentage of lime salts. The most obvious peculiarity of the alimentary system at the time of birth is the absence of teeth. The deciduous or milk teeth are 20 in number. The first to appear are the two lower central incisors which, as a rule, are cut from six to eight months after birth and the set of deciduous teeth is generally completed within the first two or two and a half years. Both the time and the order of appearance of the teeth are subject to considerable variation. Infants may even be born with teeth, but this is very rare. The permanent teeth, starting with the first molars, start to appear about the sixth year and are completed, except for the third molars, or wisdom teeth, from the 13th to 15th year.

The stomach lies obliquely in infancy, and vomiting may occur very easily from contraction of the organ, without the severe strain with which retching is attended in older subjects. The comparatively very large size

of the liver indicates that it is an important organ throughout childhood. The digestive process in infancy is deficient in the power of transforming starch into sugar. The question whether a child is to be strong and healthy or the opposite is determined very largely by its nutrition during the early months of life. The superiority of human milk over all other foods for infants, from the point of view of digestibility and nutritive value, is proved by all experience. Where artificial feeding has to be resorted to, the best substitute for human milk is to be found in some modification of cow's milk, wherein the proportions of its constituents are made more nearly to resemble those of human milk. The modification of cow's milk consists in diluting the milk to reduce the proteid to the required amount, and adding fat (cream) and sugar of milk in suitable proportions. The proteid of cow's milk is less easily digested than that of human milk, and the dense curd which it forms in the stomach often gives rise to alimentary disturbance. Great advances have been made in recent years in the feeding of infants and diet of older children, due, in part, to the discovery of new vitamins.

The heart is of relatively large size during infancy. The blood pressure is low. The pulse is rapid, and in infants it is often slightly irregular. During the first year the pulse rate is from about 110 to 120 when the child is at rest. At the age of seven or eight the rate has fallen to between 80 and 90. At the time of birth the lungs contain air. The cry of the infant at birth begins the process of inflation—a process which takes place gradually, being most rapid in robust infants with a strong cry. The lungs are very liable to disease during childhood. The brain is relatively very large at birth, and it continues to grow actively till about the age of seven, when it attains almost its full size. After the age of seven it grows very slowly in weight, but the complexity of its structure and of the arrangement of its fibres continues for a considerable time to augment greatly. During early childhood the nervous system is very unstable and excitable, and the power of control is defective. Hence numerous functional nervous disorders are common, and these often arise from quite trivial causes. Accordingly, it is of great importance that the child should be protected from all unnatural excitement, that the diet should exclude all stimulants such as tea, coffee, and

alcohol, and that an abundance of sleep should be secured.

At the time of birth a healthy infant usually weighs about 7 lbs., but a weight of 8 or 9 lbs. is not uncommon. Boys weigh slightly more than girls. During the first few days of life the child loses a few ounces, but this loss is usually made up in about a week. After this the infant should gain from two-thirds of an ounce to one ounce daily for the first four months, and from one-third to three-fourths of an ounce for the rest of the first year. The baby's weight should have doubled at the age of six months, and trebled at the age of one year. Girls are taller than boys at the ages of 12 and 13, and heavier at the ages of 12, 13, and 14. At all other ages the boys are both taller and heavier. During the first few weeks after birth the infant can scarcely be said to have any mental life at all. The movements of the head, the body, the limbs, crying, sucking, sneezing, and so on, take place simply as the result of organic conditions or of external stimuli. Speech furnishes a very good indication of the progress of mental development. The progress of comprehension of words and gestures is much more rapid than the progress of articulation. During the third six months more words are used, and they are applied more definitely. Before the end of the second year the child can usually make use of short sentences, but there is difficulty in pronouncing certain sounds.

For some time after birth all movements are obviously independent of will. These early movements are usually classified as (a) random or impulsive movements, which are very numerous during the early weeks of life, and which are not obviously dependent upon any sensory stimulus; (b) reflex movements, with arise in response to sensory stimuli; (c) instinctive movements, which also arise in response to sensory stimuli, but which are more complex and more variable than simple reflexes—e.g. seizing, raising the head, creeping. The entire process of mental development is assisted by innate or hereditary tendencies, which appear serially with the progress of the child's experience of the world about it. The earlier forms of emotional expression—e.g. fear—are obviously hereditary, for they occur at such an early period that imitation is out of the question. The part taken by innate tendencies in the child's development is perhaps best seen in play. Play is undoubtedly instinctive. Undoubtedly, also,

it is a highly important factor both in bodily and mental development.

The chief problem of modern education is to adapt the methods of education to the nature of the child. The most successful effort in this direction is found in the kindergarten system, which seeks to develop the bodily and mental powers by carefully chosen occupations, games, songs, and other means, which the children will look upon as play. 'Nursery Schools' taking children from the age of two years or even less, are growing in popularity but are privately run and not part of the Public School System. The co-education of boys and girls during the ordinary school period has been extensively carried out in the United States, and to a less extent in Great Britain, and apparently with favorable results. As adolescence approaches, however, the differences between the sexes assert themselves more strongly, and indicate the necessity for separate tuition and a different curriculum. See A. F. Chamberlain's *The Child, a Study in the Evolution of Man* (1900), which gives a very full bibliography; Harriet Johnson's *Children in the Nursery School*; A. Jesell's *Handbook of Child Psychology*; M. V. O'Shea's *The Child: His Nature and His Needs* (1925); A. H. Arlitt's *The Child from One to Twelve* (1931); Blanton's *Child Guidance* (1927). See also magazines: *Education*; *National Educational Association's Journal*; *Parents' Magazine*; *School and Society*. See CHILD STUDY. Compare also CRUELTY; INFANT.

**Child, Francis James** (1825-96), American scholar and educator, was born in Boston, Mass., and graduated at Harvard (1846), where he held the chair of rhetoric (1851-76), and that of Anglo-Saxon and Early English literature (1876-96). He published *Four Old Plays* (1848), *Poems of Sorrow and Comfort* (1865), an important edition of Spenser (5 vols. 1855), and his valuable *English and Scottish Ballads* (8 vols. 1857-8; new ed. 1882-96). This latter work gives various readings of the ballads, with comparative notes, and is admittedly one of the half dozen greatest productions of English-speaking scholars. See Prof. Kittredge's biographical sketch contained in the 1882-96 edition.

**Child, Sir Josiah** (1630-99), English writer on trade, a London merchant. He was chairman of the East India Co., and advanced its interests by a boldly unscrupulous policy.

**Child (née Francis), Lydia Maria** (1802-80), American author, was born at Medford,

Mass. She established, 1826, the *Juvenile Miscellany*, the first monthly magazine for children published in the U. S. Both she and her husband took up the anti-slavery cause with vigor in 1831, and Mrs. Child's *Appeal for that Class of Americans called African* (1833) was the first anti-slavery book published in the U. S. She edited the *National Anti-Slavery Standard*, 1840-3, at New York. See her *Letters*, with Biography by Whittier (1882).

**Childbirth.** Alarmed at the high rate of maternal mortality in childbirth, reckoned at an average of 16,000 mothers a year in the United States, the Children's Bureau of the Department of Labor made in 1933 a survey of 7,380 deaths of mothers in 15 selected states (13 states over a period of two years, two states for one). This report was then submitted to a committee of leading obstetricians, who studied it carefully and made the following pronouncements. One-fourth of the deaths were not due to maternal mortality as commonly understood, but marked the ending of pregnancy so premature that the infant could not survive. Fifty-four per cent had not had any prenatal care. Their final analysis was that in a very large proportion the deaths were due either to lack of proper instruction or advice, and that in only one per cent of the cases studied was the care up to the standard that it was the right of every patient to expect from a physician. This report led in the year 1934 to action by authorities in raising their medical requirements; by medical associations to inform all members of their profession in the newer methods of prenatal care and obstetrics. Use of sulphanilamide and other recent discoveries aided the decline in the maternal death rate through 1943.

**Childebert**, two kings of the Merovingian Franks, CHILDEBERT I., son of Clovis; received the western quarter of his father's kingdom at the partition of 511; defeated the Visigothic king, Amalrich II., near Narbonne (513); and conquered Burgundy (532). He died 558.—CHILDEBERT II. (571-596), son of Sigbert and Brunhild of Austrasia; succeeded his father in 575, and in 593 inherited the crown of Burgundy.

**Childeric**, name of three kings of the Merovingian Franks CHILDERIC I., reigned from 463 to 481, and was the father of Clovis—CHILDERIC II., king of Austrasia from 660, and of Neustria and Burgundy from 669; was killed in 673.—CHILDERIC III., the last of the Merovingian kings (743-751), was

deposed by Pepin the Short, and died in a monastery at St. Omer in 754.

**Child Health.** See **Child; Public Health (Infant and Child Hygiene.)**

**Child Labor.** Child labor, even in its opprobrious sense, existed long before the Industrial Revolution that began in England toward the close of the 18th century and reached America a few decades later. In both countries it was customary for children to work at home with their parents when industrial production was largely a home enterprise, or away from home under the protective and educational conditions of apprenticeship (see **APPRENTICE**); but industry went out of the home, and apprenticeship went out of industry until it almost disappeared. The work of children, although already there had doubtless been abuse of their labor power, assumed a new and different character—it became work at fatiguing and repetitive machine processes, work lacking in protective and supervisory features, work at tasks which possessed little or no educational value and led nowhere, work that in many instances was deforming pliable bodies, producing sickness and disease, and permanently ruining the health throughout shortened lives.

In England the movement for the regulation of child labor (apart from the earlier guild and apprenticeship legislation) dates from the first half of the 19th century, when a series of parliamentary inquiries gradually aroused public opinion to the abuses attending the unregulated employment of children. The first regulatory measure was enacted in 1819, prohibiting the employment in cotton mills of children under nine years of age and limiting the working hours of children. By a further act in 1833 the provision was extended to all textile mills, the number of hours during which children might work was further limited, and provision was made for factory inspection. In 1918 the Fisher Education Act provided for the regulation of child employment in all forms of gainful occupation, including agriculture and domestic service. As in England, the earliest measures against child labor in the United States belong to the first half of the 19th century. Six States had made special provision for the education of children employed in manufacturing industries prior to 1860, and eight States had made some attempt to regulate hours of labor for children. Commencing about the middle of the century, laws were enacted prohibiting the employment in man-

ufacturing industries of children under certain ages, varying in the different States.

Child labor legislation is so diverse in its character that a comprehensive statement of its tendencies is difficult. In general it may be said to include minimum-age provisions; educational requirements for admission to employment; the requirement of certain conditions of health and physical development; legislation requiring school attendance (at full-time or continuation schools); limitations of the hours of labor for children, now in force in practically all industrial States of the United States; prohibition of night work for children; special provisions against hazardous or unhealthful occupations or occupations dangerous to morals; measures for enforcement, including factory inspection and the requirement of 'working papers' or employment certificates.

The first Federal measure for the regulation of child labor was the so-called Keating-Owen bill, passed by Congress on Sept. 1, 1916, and effective Sept. 1, 1917. This bill regulated child labor indirectly through the control of interstate or foreign commerce. On June 3, 1918, after this law had been in operation 275 days, it was declared unconstitutional by the Supreme Court of the United States, on the ground that it was an undue extension of the power to regulate interstate commerce. On Feb. 24, 1919, Congress enacted as a part of the Revenue Act of that year a provision levying a tax of 10 per cent. on the annual net profits of any mill, cannery, workshop, factory or manufacturing establishment, or any mine or quarry, employing children in violation of the age and hour standards established by the former Federal law. This measure was also declared unconstitutional by the United States Supreme Court on May 15, 1922, on the ground that it was an infringement of the reserved rights of the States.

Two attempts to pass a Federal Child-labor law, constitutionally valid, having failed, it was felt by many that the constitution should be so amended as to give Congress a definite sanction for legislation of this subject. On April 26, 1924, the House of Representatives, and on the following June 2 the Senate, passed a resolution which submitted to the several States for ratification a child-labor amendment in this form:

Section 1. The Congress shall have power to limit, regulate and prohibit the labor of persons under eighteen years of age.

Section 2. The power of the several States is unimpaired by this article except that the operation of State laws shall be suspended to the extent necessary to give effect to legislation enacted by the Congress.

This proposed grant of authority, if ever ratified by three-fourths of the States, will become a part of the Constitution of the United States. It does not contain or require legislation, or establish standards to which legislation must conform, but gives Congress the right or power to act within a designated scope of authority and leaves the States free to pass and enforce laws which do not conflict with the national standards which may be established by Congress.

When this amendment was brought before the states for ratification a strong campaign of opposition was launched, one of the chief antagonists being the National Association of Manufacturers. By 1939 only twenty-eight of the thirty-six states necessary had ratified the amendment.

The codes of the National Recovery Administration of 1933 and 1934 tended to decrease the employment of minors in many industries. See U. S. HISTORY, NEW DEAL.

An important event in the field of child welfare was the White House Conference on Child Health and Protection, Washington, D. C., Nov. 19-22, 1930. It was a gathering of medical men, sociologists and social workers in an effort to co-ordinate all the conflicting and overlapping agencies for child welfare and to formulate a program for the future. The conference adopted a 19-point 'bill of rights' for the American child, listing the minimum services to which every child has the right, for its development and protection. This was the third conference of its kind, the first being called by President Roosevelt in 1909, from which the Children's Bureau originated, and the second, called by President Wilson in 1919, recommended the enactment of the Sheppard-Towner law for Federal aid to state programs for maternal and child-health, and also urged the adoption of the unsuccessful child labor amendment.

In the long campaign for child labor and compulsory-education laws in America, and for an intelligent public understanding of the nature and extent of the child-labor evil, the National Child Labor Committee, since its organization in 1904, has taken a leading part. Its work is supported by the contributions of its members in all the States of the Union. It publishes numerous pamphlets and

reports and a monthly bulletin, *The American Child*. The Mass. Child Labor Committee, the N. Y. Labor Committee, and similar organizations in some other States, also conduct research and publicity. The Federal Fair Labor Standards Act of 1938 practically brought an end to the employment of children under 16 years of age by manufacturing concerns having an output of products for shipment in interstate commerce. Under the impetus of war production, the number of workers of age 14-18 climbed from 900,000 April, 1940 to 3,000,000 in 1942.

Consult the various publications of the Children's Bureau; pamphlets and reports of the Child Labor Committee, New York City; Loughran, *Historical Development of Child Labor Legislation in the United States* (1921); *Child Labor Laws and Child Labor Facts* (1929).

**Children, Crippled.** While crippled children have always received attention in general hospitals, there were no special institutions for their care in the United States prior to the establishment of the New York Orthopaedic Dispensary and Hospital in 1863. The New York Hospital for the Ruptured and Crippled was founded in 1866, and the Children's House of the Home for Incurables, in Philadelphia, in 1867. Other institutions were subsequently opened. There are now State institutions for crippled children, or provisions for the medical and surgical treatment of such, in many states. Educational and vocational training is carried out in classes conducted in hospitals, in private schools, and in special classes in day schools. The National Society for Crippled Children was formed in 1921.

Consult E. G. Reeves' *Care and Education of Crippled Children in the United States* (1914).

**Children, Cruelty to.** The first agency for the protection of children was organized in New York in 1874 and since that time over 500 similar societies have been instituted throughout the world, thousands of children have been rescued, and through their efforts many laws have been enacted for the protection of children.

**Children, Delinquent.** Up to the year 1823 it was customary to speak of 'juvenile crime' and 'juvenile criminals.' The delinquent child was regarded as an enemy to the State, and was tried for his crimes and sentenced to prison like adult criminals. In 1824 the New York House of Refuge was established upon a new principle. The child was

no longer counted as an enemy of society, but as a ward of the State. He was not sentenced for a definite time, but was committed to the guardianship of the Board of Trustees, subject to release on trial at their discretion. This plan proved so rational and successful that it has spread throughout the civilized world. The difficulty of this work increased with the development of the juvenile court. Children who are least vicious and most reformable are placed on probation, and do not reach the juvenile reformatory. The more vicious are first tried on probation, and when probation fails are sent to a juvenile reformatory. It has been found necessary in most reformatory institutions to separate the defective children from those who are mentally normal, and to devise special training for them. Most juvenile reformatories are well equipped for vocational education.

This work is enlisting men and women of the highest degree of intelligence and education. It is now a common practice for schools and courts to employ parole agents whose duties are: first, to become acquainted with the child, his disposition and his needs; second, to ascertain whether his own home is such that he can have a fair opportunity, if returned to it; third, if not, to find for him a suitable home in some other family; fourth, to maintain a friendly and helpful oversight until the child is established in right doing. Increasing effort is being made to adjust the delinquent child in his own community, through social work in the schools, child-guidance clinics and other forms of social service. Only the very difficult cases of juvenile delinquency are left for commitment to correctional institutions—notably those with inherent defects in will power and responsibility. Mass repression and punishment has given way to constructive treatment of the individual child.

In 1940, of all persons arrested 20% were under 21 years of age. Reports from scattered localities, as defence "boom towns" and communities near training camps, showed in 1943 and thereafter a sharp increase in delinquency as a result of World War II. See CHILDREN'S COURTS; PROBATION; REFORMATORIES.

**Childrenite**, a rare mineral species found in small brilliant orthorhombic crystals of yellowish-brown color. It is a hydrous basic aluminum iron phosphate.

**Children, Legislation in Behalf of.** A large part of the legislation in behalf of children in former years related to their prop-

erty rights. If a man died, leaving an estate, however small, a guardian would be appointed and placed under bond to secure the sacred property rights of the child; but if there was no property, and the child was left destitute, no guardian was appointed, because there were no sacred property rights to be guarded. In colonial times, laws were enacted authorizing the apprenticing of orphans and homeless children in order that they might be trained in some useful trade or occupation, and similar laws have been enacted in all of the States of the United States. Laws have also been enacted, from time to time, establishing institutions for orphans, delinquent children, deaf children, blind children, feeble-minded children, crippled children, and so forth. Laws have also been passed to punish cruelty, abandonment, and neglect.

In 1899 the legislature of Illinois enacted the first juvenile court law, which proved so satisfactory that similar laws have been adopted in other States. (See CHILDREN'S COURTS).

Great differences exist in these laws and in the laws of the different States of the United States. In the western hemisphere the American International Institute for the Protection of Children, established in 1924, has worked out standards of legislation. The Child Welfare Committee of the League of Nations is also an influence in this field.

Laws have attempted to diminish the physical and moral risks to children by prohibiting the sale of intoxicants, habit-forming drugs, and tobacco to minors, by prohibiting their presence in places where there is moral or physical hazard, and by child labor laws. Noteworthy is the radical legislation of Soviet Russia placing upon both parents and the State responsibility for the support of illegitimate children. There is similar legislation in Austria, Scandinavia, Germany, Holland and England. Several States of the United States have adopted legislation under which both parents are liable for support and in Minnesota there is State guardianship of such children. In most of the American Republics, although no increase in delinquency was reported for the years of World War II, strong measures were taken for improving the treatment of juvenile delinquents. Additional juvenile courts were organized, local child-welfare boards established, and numerous committees were appointed to study the problem.

**Children's Aid Societies** are organiza-

tions which undertake to meet the needs of dependent and neglected children in the communities where they are located. Many societies for the prevention of cruelty to children and some humane societies perform the functions of children's aid societies.

Some of these societies maintain homes for the temporary care of children; some maintain summer homes for children; some carry on summer-outing work, some conduct industrial schools for poor children. Many of them board out children temporarily in family homes, and all of them place out children without payment of board. The ideal children's aid society says to the public: Any one who is in trouble about a child may come to us, and we will endeavor to solve the problem.

**Children's Bureau.** The National Congress in 1912 passed a bill establishing the Children's Bureau, which is a division of the Department of Labor. The law provides that: 'The said bureau shall investigate and report to said department upon all matters pertaining to the welfare of children and child life among all classes of our people, and shall especially investigate the questions of infant mortality, the birth rate, orphanage, juvenile courts, desertion, dangerous occupations, accidents and diseases of children, employment, and legislation affecting children in the several States and Territories.'

The Bureau undertakes studies of infant mortality, children's care, nutrition, children's protective laws, child labor, international progress in child welfare, and publishes aids to infant care. It co-operates with the States in their administration of the Sheppard-Towner Act and in local child welfare. The dominant note in its 1942 activities was the protection of children in wartime.

**Children's Courts or Juvenile Courts.** The Illinois State Legislature of 1889 passed the first 'juvenile court law,' as a result of a movement started by the Chicago Women's Club, and seconded by the child-helping organization of Illinois, the Cook County Bar Association, the Illinois State Bar Association, and the Illinois State Conference of Charities.

This Act removed children under sixteen years of age from the category of criminals, and classed them as 'delinquent children.' The jurisdiction of children's cases was transferred from police courts, justices' courts, and criminal courts to the circuit court. The proceedings became chancery proceedings, instead of criminal proceedings, and the children were treated as wards of the court,

rather than as enemies of society. The case became the State of Illinois *pro* Johnny Jones, instead of the State of Illinois *vs.* Johnny Jones. Proceedings were begun by a 'petition,' not by a complaint or indictment. The law provided for the appointment by the court of probation officers, discreet men and women of good character, to make such investigations before and after trial as the court might direct, and to watch over and befriend children who became wards of the court. The law provided for the presence of the probation officer at the trial, not to prosecute, but to represent the interests of the child. The law provided for the release of the child on probation under the supervision of a probation officer, or for his commitment to some suitable institution, not for punishment, but for care and training. (See PROBATION.)

The juvenile court system was not the invention of one or more wise individuals, but rather an evolution. Boston for years previously had tried children's cases apart from those of adults. In Canada a law had existed for a number of years which embodied many of the features of the juvenile court system; but Illinois was the first to give definite form to the juvenile court. The honor of formulating this law, and especially of substituting chancery proceedings for criminal proceedings, belongs to the late Harvey B. Hurd of Chicago, chairman of the committee which framed the law.

Judge Ben B. Lindsey, formerly of the Children's Court of Denver, Col., was one of the most active promoters of the juvenile court system and the originator of some of its features, especially in the employment of the honor system with young delinquents.

The most essential feature of the juvenile court law is the probation officer. Children stand in the relation of wards to the State and the State recognizes that the juvenile courts have a great responsibility both for the child and the State. The Children's Bureau has estimated that approximately one child in every 100 of juvenile court age comes before the courts as delinquent in the course of the year. It is a fairly well accepted goal of those interested in the movement that the juvenile courts should have exclusive jurisdiction at least to the age of eighteen years, with power given the judge to waive jurisdiction above the age of sixteen. Consult *The United States Children's Bureau, Juvenile Court Standards* (1923), *The Child, the Family, and the Court* (1929), *Youth and*



*Crime* (1930); the White House Conference on Child Health and Protection; *The Delinquent Child* (1932).

**Children's Home Societies.** In 1883 was organized by Rev. M. V. B. Van Arsdale, of Illinois, the 'Children's Home Society,' an agency for placing homeless children in family homes. The plan found favor and spread from State to State until there were some 32 States loosely federated under the name of the 'National Children's Home Society,' with 18,000 children under their guardianship. It later became the 'National Children's Home and Welfare Association,' with headquarters in Chicago, and it consisted of 28 organizations engaged in the use of foster homes for the care of dependent children. It co-operates with the National Conference of Social Work and the Child Welfare League of America.

**Childs, George William** (1829-94). American publisher and philanthropist, was born in Baltimore, Md.; became partner in the well-known firm of Childs & Peterson at Philadelphia. In 1864 he bought a small paper, *The Public Ledger*, and during his thirty years of ownership made it the most popular newspaper of his city. He is chiefly remembered as the erector of monuments to the great authors of past times. His works include *Recollections of General Grant* (1885); *Personal Recollections* (1890).

**Child Study.** For many years the study of children has been one of the chief activities of serious students of education. The methods adopted in child study depend upon the end in view—anatomy, physiology, anthropometry, psychology, all receiving their share of attention. Psychology has formed the centre of child interest, partly because in the activities of children we find the simplest expression of the human mind, and partly because of the special difficulties involved. The methods pursued may be divided into two groups: (1) the individual method, which consists in studying a single child as fully as possible; (2) the collective method, applied chiefly to older children, in which some single object is studied in a large number of children.

The psychological study of defective children is based upon the 'Binet Tests,' invented by Dr. Binet of Switzerland, supplemented by additional tests devised by Leightner Witmer of Philadelphia, William D. Healy of Chicago, Henry H. Goddard of Vineland, New Jersey, and others. The plan of psychological study is applied to children

brought into the juvenile courts; to children in the public schools, to children in reformatories, and to young men and women in adult reformatories. Child guidance is a term applied to that branch of mental hygiene which offers a method of study and treatment of maladjusted children. The child guidance movement became prominent with the National Committee for Mental Hygiene founded in 1909. In child guidance all the relative elements of a child's life are taken into account. In child clinics, of which there are about 500 in the United States, may be found child study using physicians, psychiatrists, psychologists and social case workers. Investigations of the health of school children have indicated the necessity for periodical medical inspection of children if much educational effort is not to be wasted.

In a similar way the study of the natural



Scene in Chile.

instincts and interests of children is more and more being taken as indicating the kind of historical, moral and religious instruction suited to each age. See NATURE STUDY.

Consult C. M. Baudouin, *Mind of the Child* (1933); S. and M. G. Blanton, *Child Guidance* (1927); N. Norsworthy and M. T. Whitly, *Psychology of Childhood* (1933).

**Chile**, or **Chili**, a republic of South America, occupying the strip of land between the Andes Mountains and the Pacific Ocean, from the southern boundary of Peru to the south-

ern extremity of the continent. No part of its territory is more than 130 m. from the coast. Its area is 296,700 sq. m. The eastern boundary is the Cordillera of the Andes, with summits reaching from 14,000 to over 20,000 ft. in the northern section, and diminishing to 9,000 and 5,000 ft. From about 28° s. lat. an older coast range runs southward, parallel with the Andes. These coast mountains reach heights of from 2,000 to 3,000 ft., and their slopes dip into the ocean, with practically no level coast lands. Between the coast range and the Andes lies a great tableland that becomes a valley toward the s., and extends to the Gulf of Reloncavi. From the latitude of the Gulf of Reloncavi and Lake Nahuel-Huapia the Andes are also crossed by several rivers, and farther south by deep fiords, the watershed here running along the plateau of Patagonia. Between the Andes and the watershed are fertile valleys easily accessible from the Argentine Republic. The soil is generally fertile, even the desert country producing luxuriant crops wherever irrigation is practised.

A large part of the present surface of Chile is of volcanic formation, and earthquakes are common. There are many volcanic peaks; those active since 1880 are Osorno (7,200 ft.) and Calbuco (7,000 ft.). The flora of Chile includes the Chilean pine, beech, elm, Chilean oak, walnut, chestnut, quillaia, lingue, and eucalyptus. The potato is supposed to have originated in Chile, and is abundant in the s., as are also the strawberry, date, palm, bean, and pepper plant. Large expanses of rich natural grasses afford excellent pasturage.

Deer and foxes are plentiful in the woods. Ducks and other water fowl and wood pigeons are abundant; and paroquets and other subtropical birds are found in many localities. The sea fauna is remarkably abundant, and includes cod, dolphin, whale, seal, and a species of sea elephant. The forest zone in the s. covers about 11,231,685 acres. The chief forest product is timber, especially pine. Soapbark is exported. Chile is rich in minerals. Nitrate (including iodine) and copper accounted for about 80 per cent of all exports from 1902 to 1932, but, during the period 1920 to 1931, copper rose to 25 per cent and nitrate fell to 55 per cent. Chile is the world's second largest producer of copper. In 1939, 339,173 metric tons of copper were produced. There are estimated to be a billion tons of iron in Atacama and Coquimbo provinces and two billion tons of coal s. of Valparaiso. Iron, coal and lead are exported.

Gold and silver are produced and cobalt, borate of lime, manganese, borax, gypsum, sulphur, salt, marble and nickel. Chile supplies from its nitrate fields most of the world's consumption of iodine, exporting about 1,000 metric tons of iodine annually. The agricultural zone between the Andes and the coast mountains is endowed above most parts of the world in all that makes an agricultural country. Yet Chile is a large importer of foodstuffs due to the marked feudal nature of land ownership and primitive agricultural methods. The chief crops are cereals, fruits, vegetables, tobacco, wheat, potatoes, maize, oats, barley, haricots, peas, sugar beet, flax, hemp, coffee, sugar cane and cotton. In regions of Patagonia and Tierra del Fuego are vast pasture lands where sheep farming is important and dairy farming is increasing.

In 1942 Chile had 6,000 m. of railways. From southern Chile to Panama there was unbroken railway connection. Many steamship lines ply regularly between Chilean ports and other countries, passing through the Panama Canal or around the Strait of Magellan. In general, the rivers are navigable only for short distances from the coast, and but few are navigable for large vessels. The Chilean Air Service from Santiago to Arica and intermediate ports; Pan American Grace Airways from Chile to the United States and intermediate countries; Compagnie Générale Aéropostale (mail only) Santiago-Buenos Aires-Paris (9 days) are operating. There are wireless stations along the coast operated by the Navy, an international radio station, at Quilicura, and several broadcasting stations. Chile has made remarkable industrial progress. The manufacturing industries operate principally for domestic consumption and employ about one-fourth of the industrial population of the country. The most important manufactures in order of rank are: textiles, cement, foodstuffs, leather, gas and electricity, clothing. The commerce of Chile for 1941 amounted in imports to 524,821,900 gold pesos; exports 767,885,700 gold pesos. Of the imports the U. S. furnished (millions of gold pesos) 297.9; Gr. Brit., 47.7; Japan, 24.8. Nitrate and copper constituted most of the exports.

The monetary unit of Chile is the gold *peso*, valued at 12 cents United States money in normal times. The great majority of the people in Chile are of European stock. In the valleys or western slopes of the Andes are Indians of the Araucanian tribe (30,-

coo); in the n. are the changos (laborers); and in and about Tierra del Fuego are the Fuegians (mostly nomadic). In 1942 it had a population of 3,864,000, of whom 50 per cent were urban. The Army of Chile is composed of an active force of 20,000 and the reserves of about 212,000 (1941), in which all able-bodied citizens between the ages of 19 and 45 must serve. In 1918 an Air Force was organized; in 1941 it had about 100 airplanes and 3,000 personnel. In 1941, the Navy had one dreadnought, one armored cruiser, two protected cruisers, eight destroyers and nine submarines. The government (under the Constitution of 1925) is a republic, composed of 15 provinces and 2 territories. Every male citizen of 21 years is entitled to vote if able to read and write. The President is elected for a term of six years by direct vote and is not eligible for a second consecutive term. The National Congress consists of a Chamber of 143 deputies, and a Senate of 45 members. A High Court of Justice sits at Santiago, and there are eight courts of appeal, tribunals of First Instances in each department and second class judges in the subdelegations.

The first European to land in Chile—at Chiloé in 1520—was the Portuguese discoverer Magellan, after his famous voyage through the strait which now bears his name. After the conquest of Peru by Pizarro, an expedition was sent under command of Pedro Valdivia in 1540, which succeeded in annexing the territory as far as the River Maipo, and founded Santiago, the capital (1541), and other settlements.

These were nearly all destroyed in a general uprising of the Indians in 1553, and for almost a hundred years there was practically no cessation of the warfare. A peace established in 1640 was broken by Indian wars, and for the next one hundred and fifty years the colony struggled against the cruel and selfish policy of Spain. In 1810 a revolt against the Spanish power broke out in which Don Bernardo O'Higgins played a conspicuous part, and finally became the first dictator of the new republic. Complete independence was not achieved until 1818; and the last remnant of Spanish power was not shattered till the victory of Bolívar at Ayacucho in 1824. The government was unsettled until 1847.

In 1910 the old question in regard to Tacna and Arica became acute through a conflict of the clergy of Bolivia and Chile,

both claiming spiritual jurisdiction. It was then decided to submit the question to arbitration. In 1929, with Mr. Hoover's mediation, the controversy was settled, Arica going to Peru and Tacna to Chile. Peru also received \$6,000,000 and Bolivia was relieved of customs duties on goods entering Chilean ports bound for Bolivia.

For 30 years after 1890 the presidency was involved in an interplay of politics of a low order. In 1920 Arturo Alessandri brought to the administration a magnetic personality, but as a dictator he failed to accomplish his promises. In October, 1925, Emiliano Figueroa was elected president. During 1925 many laws were passed to improve labor and social conditions, and an income tax to break the hold of the rich. In 1926 the Central Bank was created under the advice of the Kemmerer Commission of American financial experts, to have exclusive right to issue money and to be the government's fiscal agent. In 1927 Ibañez established a dictatorship but failed to balance the budget. In 1930 a spectacular but unsuccessful revolutionary coup was attempted by five Chilean exiles under Bravo and Grove who flew from Argentina in a plane piloted by two United States citizens. Ibañez was overthrown in July, 1931. Pedro Opazo, president of the Senate under the Constitution succeeded Ibañez but was forced to resign the next day and Juan Estebán Montero became acting president. After a campaign marked by much rioting and a naval revolt led by Communists, Montero was elected president Oct. 4, 1931. The Chilean fleet was forced to surrender when attacked by some 100 government airplanes on September 6. In October, martial law was proclaimed. Montero's government was overthrown on June 4, 1932. Arturo Alessandri was elected and in April, 1933, was granted dictatorial powers. The government ordered that 95 per cent of all company, factory, or office employees must be Chileans and 95 per cent of salaries and wages must go to Chileans (with a few exceptions). During 1933 Chile's economic conditions improved, and many new industries were established. On Oct. 10, Chile joined other South American governments in signing the Argentina anti-war pact and nine other multilateral treaties.

During World War I Chile maintained a policy of neutrality although she protested against Germany's ruthless submarine campaign and insisted upon her rights as a neu-

tral state. On specific invitation she joined the League of Nations Nov. 4, 1919. Chile experienced terrific earthquakes, 1939, causing loss of some 50,000 lives. She severed relations with Ger., It., and Jap., 1942.

Consult A. Edwards, *My Native Land* (1928) and *The Dawn* (1931); B. Subercaseaux, *Chile* (1943).

**Chilkoot (Chilcoot) Pass**, a difficult pass over the coast range of the Rocky Mountains in Alaska.

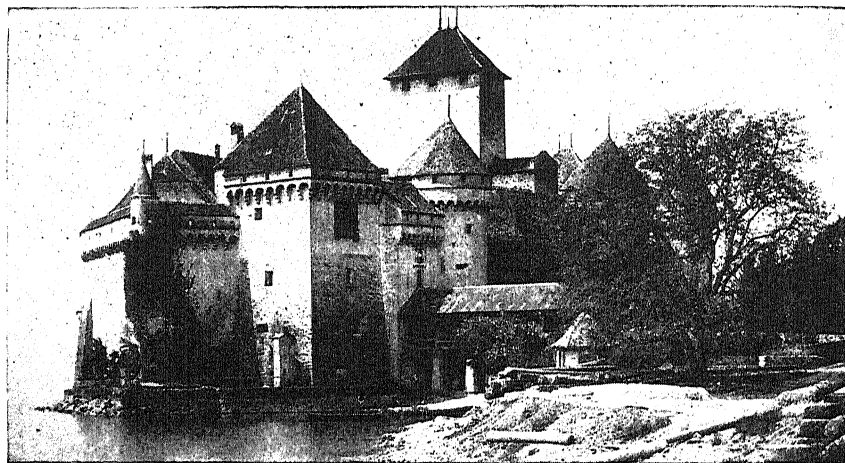
**Chillingworth, William** (1602-44), English theologian, was born in Oxford. He was chancellor of Salisbury, prebendary of Brixworth, and then master of Wigston's

Chiloé is one of the three great forest provinces of Chile.

**Chilon**, a Spartan, one of the Seven Wise Men of Greece.

**Chilperic**, two kings of the Merovingian Franks. **CHILPERIC I.** reigned from the death of his father Clotaire (561) to 584.—**CHILPERIC II.**, son of Chilperic II., reigned over Neustria (715-720).

**Chiltern Hundreds**, the three hundreds of Stoke, Desborough, and Burnham, in the Chiltern Hills, Buckinghamshire, England, formerly a tract of forest under a steward or bailiff. A nominal salary is attached to the office of steward; and being thus an



Courtesy of Swiss Federal Railroads.

The Castle of Chillon.

Hospital in Leicester. He supported the king in the Civil War, was captured by the Parliamentarians, and died in the bishop's palace, Chichester.

**Chillon**, a celebrated and well preserved castle (13th century) in the Swiss canton of Vaud. It is the scene of Byron's *Prisoner of Chillon*, which is largely imaginary, as the real Bonivard, here imprisoned (1530-6), was a political prisoner, and did not become a Protestant till after his release.

**Chills and Fever.** See **Malaria**.

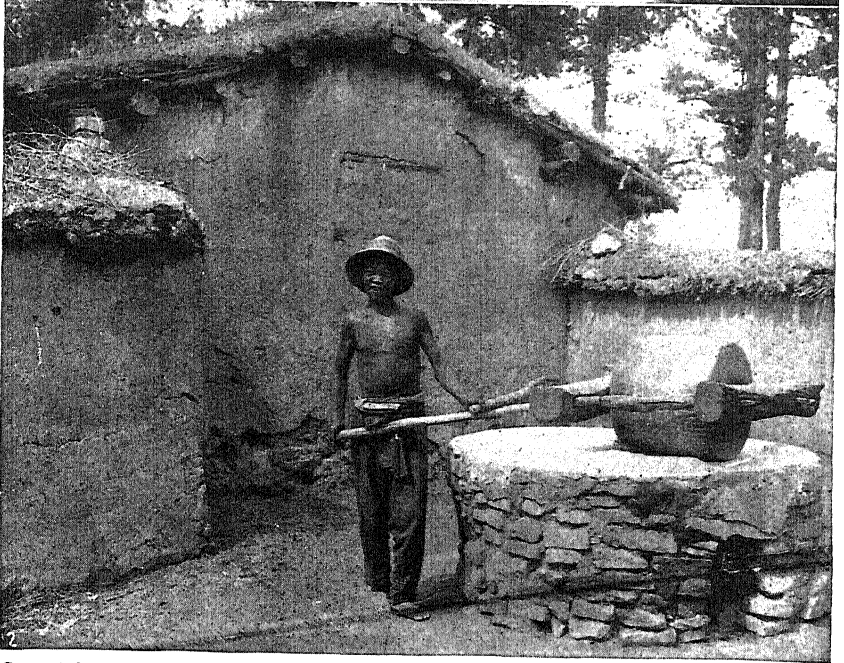
**Chiloé**, a province of southern Chile, composed of Chiloé Islands, an archipelago of about 60 m., Guaitecas Islands and Chonos Islands, and a large body of the mainland. The province contains 12,680 sq. m.; p. 183,499, mostly Indians and half-breeds. The capital is Puerto Montt. The province of

office of profit under the crown, its acceptance by a member of the House of Commons involves the vacating of his seat.

**Chimæra**, or **Chimera**, a legendary animal, according to Homer, shaped like a lion in its fore part, a dragon in its hind quarters, and a wild goat in the middle, whose breath was fire. The word is also used to describe an idle fancy of the imagination that can have no real existence.

**Chimæra (Sea Cat)**, or **Chimera**, an interesting genus of fish whose members, though generally resembling sharks, are in some respects so anomalous that they are placed in a separate order (Holocephali). The sea cats are found mostly in northern seas.

**Chimborazo**, province, Ecuador, South America, to the s. of Chimborazo mountain;



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*China: Rural Life.*  
1, Plowing in the Rice Fields. 2, Chinese Farmer Grinding Corn.

area about 3,200 sq. m. The capital is Riobamba; p. 125,000.

**Chimborazo**, volcanic mountain peak of the West Cordillera of the Andes, the highest in Ecuador, situated 100 m. s.w. of Quito.

**Chimbote**, seaport, Peru, in the department of Ancachs, on El Ferrol Bay; p. 1,500.

**Chimere**, a bishop's upper robe, to which the lawn sleeves are attached.

**Chimes**. See **Bell**.

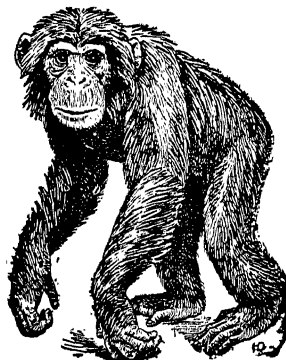
**Chimkent, Chemkend, or Tchimbkend**, town of the Syr Daria province of Kazakhstan, U.S.S.R., on a sub-tributary of the Syr Daria River. Chimkent Citadel, now in ruins, overlooks the town from a scarped terrace; it was taken by the Russians in 1864. There is a chemical factory producing santonin.

**Chimney**, a structure usually of brick or stone or metal. Chimneys serve two purposes: 1st, they produce a draught through the furnace, in order to secure combustion of the fuel with the minimum waste of heat; secondly, they discharge the waste gases into the atmosphere at such a height as to be non-injurious to the neighborhood.

**Chimney Swallow**, in North America, is the Chimney Swift. Elsewhere it is the name of a familiar swallow, as the British *Hirundo rustica*, which nests in and about walls and chimneys.

**Chimney Swift**, a small, sooty brown, swallow-like bird, the commonest of North American swifts.

**Chimoio**, station on the Beira Railway, Portuguese East Africa, 120 miles northwest of Beira, at an altitude of nearly 3,000 ft.



*Chimpanzee.*

**Chimpanzee**, one of the four living types of anthropoid apes. The chimpanzee is found on the coast of Guinea and farther inland. It

occupies a wilder area than the gorilla, and is even said to have been found in East Africa, to the south of Abyssinia. It lives in forests, is an adept climber, but keeps a good deal to the ground. The chimpanzees live in families or in small societies. They make a great deal of noise, of a dreary and horrible character, especially when provoked by other monkeys. Though they generally flee at the sight of man, they can with hands and teeth make themselves in extremity formidable antagonists. The natives shoot them with arrows or javelins, or in recent days with firearms. The flesh is eaten by the natives of some parts of Africa; the skulls may serve as fetiches.

The chimpanzee is often kept in confinement in zoölogical gardens. Such specimens have all been caught while young, suffer much from the effects of the northern climate, which is quite unsuited to them, and usually die early from pulmonary disease. They show much intelligence, and readily acquire certain human habits, such as using knife, fork, and spoon in taking food, and so on.

**China**, a country that comprises a vast territory in Asia, extending from lat. 50° to lat. 18° N., and from long. 74° to long. 134° E. It is bounded on the northwest, north, and northeast by Asiatic Russia; on the east by Korea, the Yellow Sea, and the China Sea; and on the south and southwest by the China Sea, French Indo-China, Upper Burma, and the Himalayas. It consists of China Proper and the outlying divisions of Mongolia, Eastern or Chinese Turkestan, and Tibet. The total area is estimated at 4,278,350 square m., which is considerably greater than that of Europe, and is larger than that of the United States, including Alaska.

The area is approximately divided as follows: China Proper, 1,896,500 square m.; Mongolia, 1,367,950 square m.; Chinese Turkestan, 550,580 square miles; Tibet, 463,320 square m. China Proper lies in the eastern and southeastern part of the republic, and is divided into 21 provinces. Greater China is traversed by two immense mountain systems, which have their rise in the plateau of the Pamirs: (1) To the northeast and north the Tian-shan system skirts the Mongolian plateau in a series of parallel spurs; (2) south of the Taklamakan and Gobi Deserts extend the lofty ranges of the Kwen-lun or Kuenlun system, divided into numerous parallel chains.

Two other ranges have their origin in the Tibetan plateau. The one has a north to south direction, and shuts in between snow-capped ridges the head waters of the Salwin.

Mekong, Yang-tse-Kiang, and Yalung. The other, a wide group of mountains extending from the sources of the Yang-tse-kiang in the Tang-la Mountains, bends more to the east, and includes most of the mountains of Szechuen and North Hu-peh. These two ranges, like most Chinese mountains, have no general appellation, and in default of this are named by Von Richthofen the Farther Indian and Chinese systems. The Chinese extension of the Kwen-lun Mountains, which consists of two or three parallel ranges, marks the division between the loess country of the north, where millions of people dwell in caves, and the southern provinces, where water communication exists in every direction. In climate, as well as in products, the Kwen-lun Mountains form the natural division between Northern and Southern China.

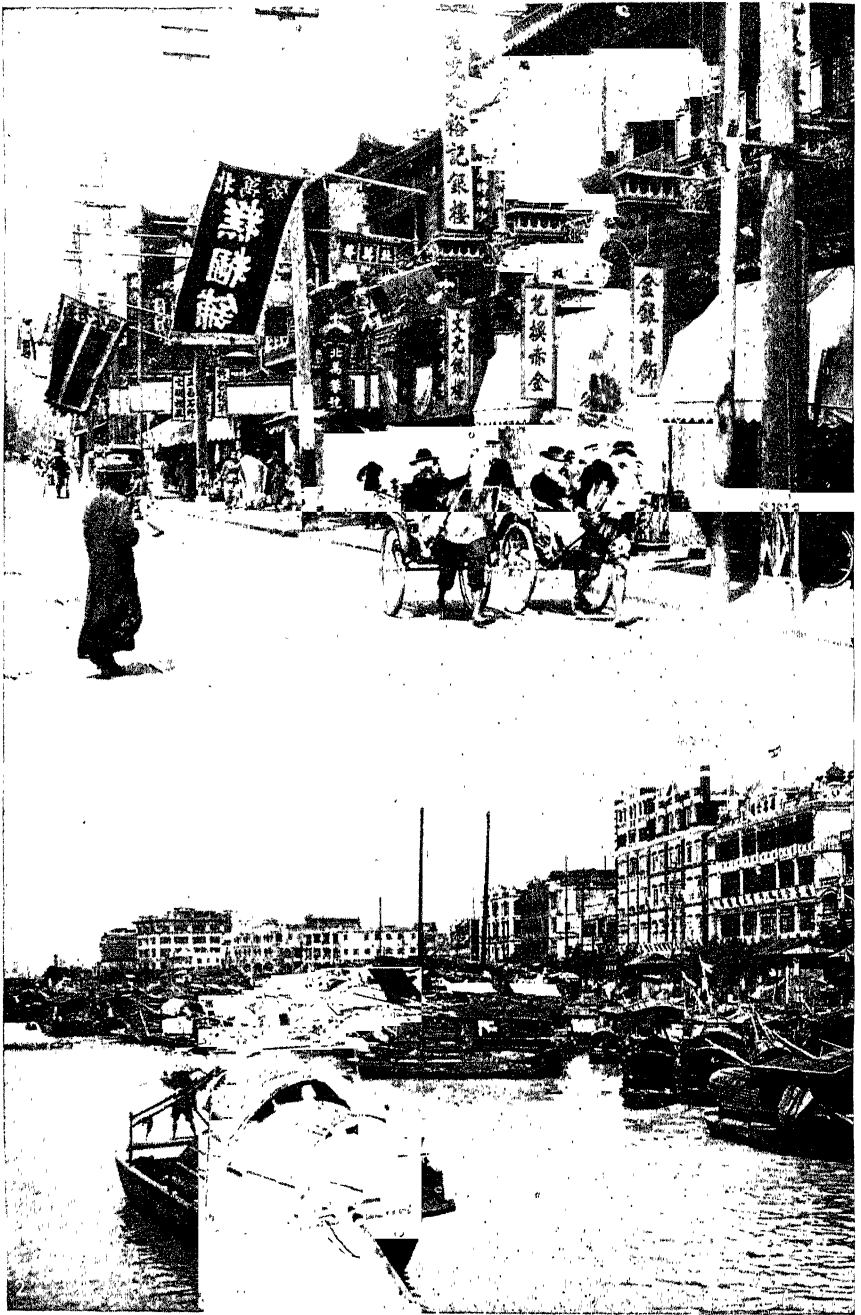
On the whole, the surface of China is mountainous, rugged, and high. The most striking physical feature of the northeastern part, however, is the Great Plain, the joint delta of the Yellow River and the Yangtse-kiang, which stretches nearly 700 miles from Peking in the north to Hankow in the south. This tract of alluvial soil covers an area of over 200,000 square m.

The most important rivers of China are the Yang-tse-kiang and its tributaries, the Yellow River, the Canton rivers, the Wei of Honan and Chih-li, the Pei-ho, and the rivers which have their mouths at Ning-po, Wenchou, Fu-chou, Amoy, and Swatow. The Yang-tse-kiang (q.v.), which is known by various names throughout its course, is the largest waterway of the republic. The Hwang-ho, or Yellow River, rises not far from the source of the Yang-tse, in the plain of Odon-tala. Numerous changes in its course and frequent inundations, causing serious loss of life and destruction of property, have gained for it the name of 'China's Sorrow.' In considering the water systems of China, it is impossible to exclude its canals from notice. In the southern section of the delta of the Yangtse-kiang alone the total length of the canals has been estimated at 36,000 m. In the corresponding section on the northern bank of the Yang-tse-kiang, the system of canals is even more perfect, though the mileage is perhaps less, as small canals are not so common. In a less degree, the whole delta of the Yang-tse-kiang below Hankow is intersected by canals. Mention should be made of the *Great Wall*, a monument of human labor that has stood for 2,100 years. In 214 B.C. Shih-huang-ti determined to erect a grand barrier

all along the north of his vast empire, to be a defence against the incursions of the Northern tribes. The wall commences at the Shanghai Pass, and is carried westward to the Kiayu barrier gate. It is about 1,500 m. long, about 25 feet wide at the base and 15 feet wide at the top, and the height varies from 15 to 30 ft. (See WALL, GREAT, OF CHINA.)

The character of the coast of China north and south of the Yang-tse-kiang differs greatly. Except in Shan-tung, there is no port north of the Yang-tse-kiang which a vessel of deep draught can enter. At the new port of Ching-wan-tao (near Shan-hai-kuan) vessels drawing 20 ft. can enter. South of the Yang-tse-kiang the coast is lined with islands throughout almost its whole length, but there are not many harbors for large vessels. In Northern China the winter is very severe. Snow falls, but on account of the extreme dryness of the atmosphere does not lie except in the mountains; the rainfall takes place between April and September; and the temperature ranges from over 100° F. to below zero. South of the line of the Kwen-lun Mountains the winter is less severe; but even in Kwangtung frosts are not unknown, and the cold is much felt on account of the moisture in the air. The climatic conditions are largely influenced by the monsoon winds (see MONSOONS), the rainfall throughout China being generally coincident with the summer monsoon. The rainfall decreases toward the interior, and excessive dryness characterizes the table lands of Central Asia and the plains of Mongolia. Another characteristic feature is the cyclonic storm called the typhoon, which is caused by the conflict of southwest and southeast trade winds in the China seas. Typhoons occur regularly every summer along the coast south of the Yang-tse-kiang.

While the greater part of the land is rugged and mountainous, there are large areas of fertile soil, notably in the Great Plain and valleys of Northern China, in the valleys of the Yang-tse-kiang and other rivers farther s., and in the Red Basin of Szechuen. This soil is extremely fertile, requiring little cultivation; but on account of its porous nature it demands a plentiful water supply. Since its character makes irrigation impossible, seasons of insufficient rainfall lead to failure of the crops and widespread famine. The alluvial soil of the river valleys and lake basins of Central and Southern China is also very fertile, and under the careful cultivation of the Chinese farmer yields abundant crops. These naturally fertile areas are supplemented in many



*Photos from Ewing Galloway. (1, by Burton Holmes).*

*China: City Scenes.*

1, Nanking Road, Shanghai. 2, Houseboats at Canton.



sections by the elaborate terracing of hill-sides, which are thus adapted to the growing of rice, cotton, and other products.

The flora of China is both rich and varied, with a gradual transition from the Manchurian types in the north to those of tropical India in the south. Although extensive forests are rare, except in the outlying districts of Southeastern Tibet, Mongolia, and Manchuria, plants of the arborescent orders are numerous. Of these the bamboo is of prime importance on account of its wide range of usefulness in the everyday life of the Chinese. Nearly every variety of fruit of the temperate zone is cultivated, as well as many subtrop-

bédède-mer, cuttlefish, and jellyfish are important food items.

The mineral wealth of China is fabulous. The coal fields are enormous, and have hardly been touched; a far greater amount of iron ore remains in the earth than has been extracted during all the centuries; and copper, lead, tin, antimony, zinc, mercury, gold, and silver exist in many places and in varying amounts.

Among non-metallic deposits are kaolin, which forms the basis of the pottery industry, and petroleum and natural gas. To the present time, poor means of transport and communication, antiquated methods of min-



*Chinese Sculpture, Western Han Dynasty.*

ical varieties. The mulberry tree is grown extensively in the interests of silkworm culture. The country abounds in flowering shrubs and beautiful plants, among them the azalea, camellia, gardenia, peony, orchid, chrysanthemum, and rhododendron.

Among the Chinese, fish ranks with rice as a food staple, and fishing constitutes one of their principal occupations. Little has been done, however, toward developing this industry, so that many of the methods in use today have been employed from the earliest times. The common edible fish are the perch, mackerel, sturgeon, goby, pomfret, eel, gudgeon, shad, sole, mullet, flounder, herring, carp, bream, and varieties of shellfish. Besides the usual sea products, sharks' fins,

ing, and the restriction of the mining regulations have prevented the development of all but a small part of China's mineral resources. These obstacles, however, are gradually being removed. The republican government has drafted new mining regulations, railroad construction is being extended, and foreign capital and foreign machinery are being applied. Salt is a government monopoly, and its importation from foreign countries is forbidden. The mineral is obtained by the evaporation of sea water along the coast, from a salt lake in Shan-si, and from salt wells in Sze-chuen and Yün-nan. The Chinese are primarily an agricultural people, cultivation of the soil taking first place among the divisions of labor, and the farmer ranking after

the scholar in the four classes of society. All land is in theory the property of the government, being held by private owners on condition of the payment of an annual tax based on the productivity of the soil. In no other country in the world is the cultivation of the soil more intensive than in China. Every available foot of space is utilized; great care and painstaking attention to detail are employed; fertilizers are used extensively; elaborate systems of irrigation are resorted to, and rotation of crops is practised; but the implements used are of the crudest description. Rice is the staple food of the Chinese, and is raised in every province except Shensi, Shan-si, and Chih-li. After rice come tea, cotton, and sugar as the chief products of Central and Southern China. The tea plants are grown in small patches about the homestead, and the leaves are picked by members of the family, and dried in the sun.

The mulberry tree, upon which the silkworm feeds, is grown everywhere, and forms the basis of China's extensive silk trade. Formerly the cultivation of the poppy for opium was of prime importance, but under the vigorous anti-opium campaign begun in 1906 (see *Opium*) it was gradually replaced by other crops. The introduction of machinery into China is of recent date; for centuries the country depended on manual labor for the manufacture of silks and embroideries, porcelains, paper, and lacquer ware, and the spinning and weaving of cotton. Since the Chino-Japanese treaty of 1895, however, which conceded to foreigners the right to engage in manufacturing, hundreds of industrial establishments have sprung up in all parts of the republic.

China long led the world in silk production, and until World War II furnished over  $\frac{1}{4}$  the total supply, being second only to Japan. There are sugar refineries at Hong-kong, Swatow, and Amoy; large iron and steel works at Han-yang, near Hankow; and hosiery, underwear, flour, rice, and oil mills in many of the larger cities. While foreign commerce is of comparatively recent development in China, inter-provincial trade has been carried on for many years, being greatly facilitated by the country's river systems, its many canals, and the abundance of labor and land transportation. Prior to 1842, the policy of China toward foreign commerce was that of uncompromising hostility. Although the Portuguese had established trade relations through the port of Macao as early as 1537, followed by Spanish, English, Dutch, French,

Russians, and Americans, it was not until the ports of Canton, Amoy, Foochau, Ningpo, and Shanghai were thrown open to foreign trade in 1842 that China entered into official commercial relations with the rest of the world. Subsequent agreements have increased the number of treaty ports to about 50; while in addition some 35 places in Manchuria, Sin-kiang, Mongolia, Shantung, Kiang-su, Kwang-tung, Chi-li, and Tibet have been declared open to international trade. In spite of the unsettled condition of affairs, and the consequent fluctuations in trade, Chinese commerce has shown a steady growth during the past twenty years. Tea, formerly the main staple of China's export trade, has suffered a decided decline through Indian competition, and is now surpassed by silk, which contributes over one-third of the value of the country's exports, and by the soya bean and its products, which have risen to a position of importance in the last few years. China's shipping is practically limited to the waters of the Far East. The China Merchants' Steamship Company, with a fleet of 31 ships, having an aggregate tonnage of 59,332, is the only Chinese steamship company of consequence, though there are a number of smaller companies, and numerous launch services operating on the inland waters. While roads are numerous, they have generally been allowed to fall into disrepair, and land transportation is mainly by rail.

Under the Republic, railway development has been in two directions: (1) extensive contracts for new construction, and (2) the combining of existing lines into a national system. The latter scheme was undertaken by a group of traffic managers and chief accountants of the various systems known as the Through Traffic Conference, which planned and carried out many features tending to uniformity and standardization. The railways already open or actually under construction in China fall into three classes: (1) those under government control; (2) foreign concession; (3) private and provincial lines. The Chinese telegraph system was begun by the opening of a line between Shanghai and Tientsin in 1881, and has been continuously expanded since. The telephone has made but little headway; the few lines in existence being owned and operated by the government as part of the telegraph system.

The Chinese post office was created by imperial edict in 1896. Domestic postage rates are lower than in the United States, and an efficient money-order system is in operation.

The taking of a census according to Western methods has never been attempted in China, and estimates of the population vary widely. These estimates are usually founded on an enumeration of the families, multiplied by the average number in a household. Estimates made upon the basis of Post Office records place the size of the population somewhere between 442,000,000 and 485,000,000, or about one-fourth the population of the earth. In 1919 the organization of the Chinese Post Office was used to secure an estimate of the population of China and its Outer Territories. An analysis of this estimate forms the basis for the following:

In China proper the population is largely concentrated in the fertile valleys of the Hoang-ho and Yang-tse-kiang. The most populous provinces are Kiang-su, with 875 inhabitants to the square mile, Che-kiang with 600, and Shantung, with 550. Congestion in the great centres, lack of sanitation and hygiene, epidemics, famines, and floods combine to make China's death rate high. Much emigration has taken place, especially from the maritime provinces of Fu-kien and Kwang-tung, and the number of Chinese in other countries is estimated at 8,000,000. Over 60 races or tribes are represented in the Republic and its dependencies, comprising Chinese, Manchus, Mongols, Tibetans, and many smaller aboriginal and quasi-aboriginal peoples. The religion of China as a whole is based upon nature worship, the belief that the entire universe is animated by good and evil spirits, and upon ancestor worship, the great national duty, about which all later faiths are built. In Confucianism the nation has a philosophy based on the teachings of 'the Master,' Confucius, which upholds the conduct of the patriarchs as a model, and defines the duties of men toward one another and of man toward himself, but which does not enter into speculations as regards the unknown. Its teachings find essential expression in its insistence upon the five constant virtues of benevolence, righteousness, propriety, wisdom, and sincerity, and in its definition of the duties of the five relationships of prince and minister, husband and wife, father and son, brother and brother, friend and friend. While the ideals of Confucianism exert an important influence in the lives of all the people, its official ceremonies are limited to the upper classes. Taoism was probably founded by the native philosopher Lao-tse in the sixth century B.C. Theoretically, it teaches the attainment of supreme happiness through con-

formation with the Tao, or order of the universe. Actually, it is a debased ritual catering to the superstitions of the people. Buddhism was introduced into China in the first century A.D. It has undergone various modifications, and today closely resembles Taoism, many of whose deities it has adopted. Its chief power in China lies in its teachings concerning a future life. Mohammedanism and Christianity have also considerable strength in China. Under the empire, Confucianism was the state religion, the emperor officiating at the annual sacrifices to Heaven and Earth. Buddhism and Taoism were also under imperial control, though their internal organization was not interfered with. Mohammedanism was practised under state recognition, and religious freedom was extended to Christians in various foreign treaties from 1842 to 1903. The constitution of the Republic, adopted in 1923, extends religious liberty to all. After much discussion, Confucianism was adopted as the state religion in 1914, and at the winter solstice President Yuan Shih-kai, clad in ceremonial robes, worshipped Heaven in the Imperial Temple as the emperors had done before him. For centuries education in China, though held in great respect, was to a large extent the monopoly of a special literary class. It was not compulsory and, with the exception of colleges in the large cities, no means of instruction was provided by the state. Such elementary schools as existed were maintained by the people themselves, and the curriculum was limited to the memorizing of the Chinese classics and easy composition. Higher education was also based on the classics, and was conducted with the aim of preparing the student for the competitive examinations for admission to public office.

The first education on Western lines was given by the Christian missionaries, who still carry on much of the best educational work in the Republic. In 1902, after the Boxer rising, the old system was reformed, and in 1906, after the Russo-Japanese War, a new system was inaugurated by imperial edict, in which the curriculum was largely based on the Japanese. Special schools were established—technical, agricultural, normal, language, etc.; thousands of temples were converted to educational purposes; and the old-style examination halls were pulled down, and colleges built on the sites.

The educational facilities still remained inadequate, however. Many Chinese students went to Japan, America, and Europe to study; and the government employed the

money returned by the U. S. Government from the Boxer indemnity to send students to the United States.

The Revolution of 1911 disorganized existing educational methods, and one of the first problems of the new Republic was to secure a sound educational system for the entire country. The program adopted provided for courses of education covering in all, 17 years. Technical, industrial, and normal schools were also provided. Every city, town, and village was required to establish primary schools, and every city higher primary schools. These, with the middle schools, are under the control of the provinces in which they are located; schools above that grade under the Ministry of Education. Features of the new plan are the emphasis placed on primary schools, the education of girls, the introduction of manual training and the teaching of hygiene, the observance of Sunday as a school holiday, and compulsory education. There are ten government universities, including the National University at Peking, and several higher normal schools. Other schools for higher education are the University of Communications, under the Ministry of Communications; the Peking Union Medical College, founded in 1906, and now (since 1915) supported by the China Medical Board of the Rockefeller Foundation; the University of Hong-kong founded by Sir Frederick Lugard and H. N. Mody and endowed by means of contributions from all parts of the world; Tsing Hua College, for the preparation of students for study in American colleges; and numerous mission schools of collegiate rank, of which the Canton Christian College is perhaps the best known.

An important factor in the development of education is the native press, which has grown with remarkable rapidity. The first newspaper in Chinese was published in 1870 at Shanghai, under the title *Shen Poa*, or *Shanghai News*. There are now over 1,000 daily, weekly, and monthly journals in China; 50 Chinese newspapers are published in Shanghai, and more than 60 in Tientsin and Peking.

Since February 12, 1912, China has been a republic. Under the present constitution, proclaimed October 10, 1923, the executive power is vested in a president, holding office for 5 years and eligible for re-election; he is assisted by a cabinet of 10 members, the premier, and ministers of the interior, foreign affairs, agriculture and commerce, education, communications, war, navy, justice, and finance. Legislative power is vested in a parliament com-

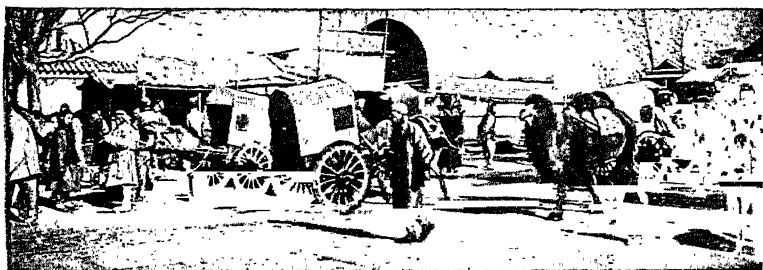
prised of a Senate of 264 members and a House of Representatives of 596 members. Senators are elected for six years, every two years, and representatives for three years. There are also a number of foreign advisers appointed to the government. For local administration the country is divided into provinces and districts.

The old legal system of China, characterized by inefficiency, mal-administration, bribery, and corruption, is being gradually replaced by a new system. The High Court of Justice at Peking is the supreme court of the nation, and is divided into civil and criminal courts, each presided over by five judges; a provincial high court at each provincial capital; metropolitan courts to decide ordinary civil and criminal cases; and courts of first instance for minor cases. China's financial standing has been greatly imperilled by its internal dissensions and in 1924 the country was virtually bankrupt.

Banking in China, until recently, has been subject to no further regulation than any other business, and as a result there are innumerable banks, many of them with small capital. A rapidly increasing number of foreign banks also operate in China, with branches in the principal cities. The currency of China is in confusion, owing to the absence of gold coin and the lack of an absolute standard. It consists of taels, dollars, copper cash, and bank notes. The tael, a weight of silver, varies in different parts of the country. The *haik-wan* or customs tael fluctuates from \$.70 to \$.80 in value. Theoretically, the tael is subdivided decimally, 1 tael being equal to 10 *mace*, 1 *mace* to 10 *candareens*, and 1 *candareen* to 10 *cash*. The actual currency in use among the people is copper cash, cumbrous, often debased, and varying in relative value in every district. It is not possible to state precisely from whence or at what date the Chinese entered China. But the Chinese have their own traditions as to the history of their race, and they include no account of migration. After the time of Pan-ku, the first man, they tell of ten periods of sovereigns. The first emperor of whom a detailed account is given is Fu-hi, 2852-2738 B.C., but he is regarded by many as a supernatural being. Following him came Shon-nung and Huang-Ti, Yas and Shun. In 2205 B.C. begins the Hia dynasty. This dynasty is supposed to have continued until 1766 B.C. when the Shang dynasty commenced. It ended in 1122 B.C. and with the next dynasty the scope of true history is reached. The period of the

Chow dynasty continued until 256 B.C. and is characterized by peace and prosperity. During this era came the three great Chinese sages, Confucius, Lao-Tze and Mencius. The Chow dynasty was overthrown by the King of Ts'in 256 B.C. and the Ts'in dynasty had its beginning in 249 B.C. The Great Wall is said to have been built during this period. On the failure of the Ts'in dynasty in 206 B.C. the Han dynasty was commenced. After this period the Chinese political system never acquired any stability, and no less than thirty-five dynasties are chronicled, none of which lasted for more than three centuries. At no

was established. It is interesting to note that the plaited queue of hair, a fashion so distinctly Chinese, was begun at this time. The great Chinese dictionary is a product of the Manchu era. It is also during this period that persecution of the Christians was begun, and that the policy of 'exclusion' was founded. From the seventeenth to the nineteenth century Chinese history is characterized by attempts to withdraw within herself and to exclude all aliens. The Chinese objected especially to draining the country of silk, tea, silver and other profitable products, by foreign traders, who gave in exchange the ener-



*At one of the inner gates, Peiping*



*Street scene, Che-kiang: street caterer—scribe—hairdresser.*

period did China attain such greatness as under the Mongol dynasty, begun when Kublai Khan ascended to the throne in 1259. Commerce flourished and territories were extended. It was during this period that Marco Polo, the first European to give the western races an accurate conception of China, was in the service of the Great Kahn. This dynasty was succeeded in 1368 by the Ming dynasty. Commerce was encouraged, and Christianity was introduced more extensively than before. This dynasty was, in due course of time, overcome by the Manchus, and in 1644 the last dynasty of China, the Ta-ts'ing,

was established. It is interesting to note that the plaited queue of hair, a fashion so distinctly Chinese, was begun at this time. The great Chinese dictionary is a product of the Manchu era. It is also during this period that persecution of the Christians was begun, and that the policy of 'exclusion' was founded. From the seventeenth to the nineteenth century Chinese history is characterized by attempts to withdraw within herself and to exclude all aliens. The Chinese objected especially to draining the country of silk, tea, silver and other profitable products, by foreign traders, who gave in exchange the ener-

gizing and expensive drug opium. This led to the so-called Opium War (1840-2), which brought about the opening to general trade of the ports of Shanghai, Ning-po, Fu-chou, and Amoy, besides Canton, and to the cession to Great Britain in perpetuity of Hong-kong. The result of all this disintegrating activity was the war of 1857-8 with Great Britain and France, and the Taiping Rebellion of 1852-64. Russia took advantage of this distraction to rectify her frontiers on the Amur and Ussuri; and the Mohammedans in Yün-nan and the Turkestan region threw off the Chinese yoke. In this way the venerable Chinese

Empire was actually brought to the point of dissolution, when through the generosity of Great Britain, aided by France and the United States, the efforts of 'Chinese' Gordon and his band of European officers succeeded in wresting Nanking from the rebels. Until the end of the century the Chinese were engaged in resisting the encroachments of the Russians in Ili, of the Japanese in Formosa and of the French in the South.

A new centre of disturbance was meanwhile created in Korea, which was opened to the trade of the world in 1882-4. The worst class government in the world had impoverished and stagnated that country till it had no future save in conquest by China or Japan, of which the first had civilized it, and both had formerly conquered it. Fresh efforts of both led, in 1894, to war between them. China was defeated, and obliged to conclude a treaty of peace, ratified at Chefoo on May 8, 1895, by which Formosa was ceded in perpetuity to Japan, together with certain portions of the Liao-tung Peninsula. Meanwhile Russia, France and Germany joined in ejecting the Japanese from Liao-tung.

China now set feverishly to work to reorganize her military system. In this she was aided by the Western Powers, who set up a brisk trade in arms. There was, also, a zealous increase in missionary propaganda, both Catholic and Protestant. In 1897, Kiao-chau was seized by the Germans, and in 1898 they secured a ninety-nine years' lease of the port from the Chinese (see SHANTUNG). Russia proceeded to occupy the very territory from which Japan had been so disinterestedly removed; and on March 27, 1898, China leased to her for twenty-five years, or longer if required, Port Arthur, Ta-lien-wan, and the adjoining territory.

As her share of the spoils, Great Britain obtained from China, on April 2, 1898, the concession of Wei-hai-wei, to be occupied as long as Russia held Kwang-tung; and further obtained a ninety-nine years' lease of territory on the coast of the southern province of Kwang-tung, immediately opposite the island of Hong-kong, with the right to fortify. France, at the same time (April, 1898), secured a ninety-nine years' lease of the coast of the Bay of Kwang-chau-wan, to the north of Hainan—a position still further strengthened by the cession, in November 1899, of the two islands dominating the bay. Roused by these external dangers, the anti-foreign Manchu element took advantage of the anti-missionary 'Boxer' rising in Shan-tung prov-

ince in 1900, and organized a campaign of extermination against all Europeans, Japanese, and Americans. (See BOXERS). The chief Western Powers, whose legations were besieged in Peking, occupied the city on Aug. 14-15, 1900, and remained over a year. Enormous indemnities were extorted by all; the United States later remitted most of its share. Meantime, Manchuria opened war on its Russian neighbors; and after dreadful atrocities, Russia overran and practically annexed it till ousted by Japan in 1905, when China also recovered Mongolia.

China was plainly doomed to extinction and partition unless radical changes were made. Two chief parties struggled for the next decade; one of these, 'Young China,' 'China for the Chinese,' sought to abolish all foreign influences, but to improve administration; the other endeavored to study and adopt foreign methods to prepare for representative government. This latter involved the abolition of Manchu privileges, and in the end, of the monarchy founded and existing on them. Such was the aim of a group of revolutionists headed by Sun Yat-Sen, a proscribed refugee physician who, from Tokyo, Japan, formed an organization joined by progressive Chinese all over the world.

The imperial court was aroused; in 1905 a commission was appointed to study foreign institutions; and a report was presented the following year. A number of edicts were issued in 1906-8 by the Dowager Empress, who shrewdly swam with a current she disliked; and in 1908 a parliament was set for 1917. The Empress, however, died on Nov. 13, 1908, and the Emperor on the next day. In 1910 a National Assembly of two hundred was created. In January 1911, elections were ordered for a real parliament to meet in 1913. In the fall of 1911, however, a terrible famine in the Yang-tse valley, which made the age-long official corruption unbearable, enabled Sun Yat-Sen's revolutionists to swing much of the South into line; a cabinet was formed at Shanghai; and on Nov. 6 Wu Ting-fang, former Minister to the United States, was made Director of Foreign Affairs.

In great alarm the National Assembly again met at Peking; on Oct. 30 issued two edicts in the Emperor's name, 'acknowledging errors' of policy, and promising early and complete reforms; rushed through a draft constitution at one sitting, which the throne accepted (Nov. 3); and made Yuan Prime Minister, and several revolutionaries cabinet ministers. But on Nov. 14 a second republic was set up

in Shan-tung; the politic Yuan refused to aid further resistance; the Regent resigned; and the new dowager, the sole ruler left, could only rely on Yuan. After conferences with the revolutionists, he counselled her to permit a national convention. This convention met at Nanking on Dec. 29, and elected Sun Yat-sen president of the first Chinese Republic.

Helpless, the aged dynasty abdicated on Feb. 12, 1912, with the following declaration: 'We hand over the sovereignty to the people. We decide the form of government to be a constitutional republic. We appoint Yuan Shih-kai to organize a provisional government.' Yuan announced the abdication, and asked the Powers to recognize the republic (Feb. 13); but only the United States and Mexico acceded. Dr. Sun, for the Nanking government, refused to recognize the royal appointment of an 'organizer'; but rather than have civil war, he resigned to let his party elect Yuan president in his place (Feb. 15). Yuan was installed on March 10, and formed a cabinet, and an advisory council pending a national assembly. The early history of the Republic is characterized by repeated attempts of the Royalists to regain control, and by almost constant disorder. Parliaments were elected, met, and were then dissolved, many times. There was great internal dissension and the rival factions set up independent governments; domestic warfare ensued.

The Far Eastern question was one of the outstanding problems before the Washington Conference on the Limitation of Armaments in 1921-22, and important steps were taken toward clarifying a difficult situation. The notable achievements in this respect were the Nine-Power Treaty: the treaty providing for a revision of the Chinese tariff, with a view to increasing the revenues of the Chinese government; the resolution agreeing to the withdrawal of foreign post offices in China; a resolution for full publicity for all treaties, notes and other international agreements with China or concerning China; and the Shantung Treaty between China and Japan providing for the restoration to China of Kiao-chau. The eventual transfer of Kiao-chau was effected in January 1923. England proposed to restore Wei-hai-wei, and the agreement was eventually signed in 1930.

On May 31, 1924, an agreement was signed by Chinese and Russian representatives whereby unconditional recognition was granted Soviet Russia. According to this agreement, Russia recognized Chinese sovereignty

over Outer Mongolia and agreed to the withdrawal of Russian troops from that region on terms and at a date to be determined by further negotiation. Russia further recognized China's right eventually to purchase the Chinese Eastern Railway, providing in the meantime for joint control, and agreed to the abolition of extraterritorial rights, and of special tariff privileges, and to relinquishment of the remainder of the Boxer indemnity.

While Communism is undoubtedly a mighty factor in recent and current Chinese history—not a few competent observers in the country, Europeans and Japanese, claim that Chinese Communism is less a Russian than a purely native product, born of continuous civil warfare and the suffering of the masses. Chinese history shows several examples of peasant revolt; it was the untrained military strength of the peasantry in revolt against high taxes and famine that broke the power of the Ming dynasty (1368-1644) and enabled the Manchu invaders to drive it out. In 1911, two hundred and sixty-seven years later, it was again the peasants in revolt who paved the way for the revolution which ended the Manchu dynasty. But since that time China has hardly known a peaceful week. With each consecutive year internal warfare became more widespread, more expensive and destructive. While the coastal cities suffered but little and had, to a considerable extent, become modernized by the adoption of Western comforts, conveniences, education and entertainments, the interior of the country presented a melancholy spectacle.

After almost twenty years of a 'republican' career, millions of Chinese are today dwelling exactly in and by the same manners and methods as did their forefathers two or three thousand years ago. Only an infinitesimally small percentage of the people have even a remote conception of the difference between autocratic monarchy and the democracy of a republic. Representative government by votes had soon proved impossible among a population with so high a percentage of illiterates. Dictatorships and the successive military rules of various war lords have been the inevitable result.

From 1927 to 1929 famine devastated the provinces of Shensi, Honan, and Kansu, reducing the population by almost 3,000,000, while the province of Shantung underwent a process of depopulation by great migrations into Manchuria. Starvation forced young men into banditry, and from these elements of the rural population Chinese soldiers were

largely recruited; bandit and soldier came to mean about the same thing.

During 1927 the Nationalist expedition that sought to unify the control of China had at first distinct success. By the end of March, General Chiang Kai-shek had won over all of China proper except Shantung and Chihli, which were still held by Marshal Chang Tso-lin, the powerful war lord of Manchuria and the strongest enemy of the Nationalists. In 1923 Sun Yat-sen had enlisted the aid and advice of Soviet Russia. The Soviet leaders sent him a brilliant diplomat and counsellor, Michael Borodin, who worked hand in glove with Dr. Sun to promote nationalism. Although both were apparently striving for the same goal, their ultimate purposes were diametrically opposed. Dr. Sun was motivated by purely Chinese ideals, to build a free and united China, a democratic, constitutional republic, entirely liberated from foreign domination. Borodin, on the other hand, planted the seeds for a Soviet Communistic China. Under his influence—at variance with the desires of Dr. Sun—the Kuomintang (Nationalist) Party was remolded on the Russian plan of party government, the army was reorganized by Russian instructors, and Russian arms and munitions were imported in large consignments.

In spite of the steady infiltration of Soviet Communism, the rank and file of the Kuomintang were opposed to it, and tolerated its presence only in the hope that it would prove of practical advantage in the prosecution of their ideals. After the death of Dr. Sun, the anti-Communists became more aggressive. When Chiang Kai-shek emerged as the actual head of the Kuomintang, Communism was proscribed and in July, 1927, Borodin returned to Russia. When the Borodin regime broke down, several Chinese generals proclaimed themselves and their troops as 'Reds.' There was no such thing as one government for China. Chiang Kaishek, however, proved himself an able military commander and steadily his Nationalist forces advanced the offensive they had begun in the spring of 1926. These troops, numbering about 450,000, climaxed their campaign and gained their objective when they drove Marshal Chang Tso-lin from Peking in June, 1928. Refusing to fight a decisive battle, Chang Tso-lin retreated in good order. Nevertheless, as he sped northward to Manchuria in his private train, he was killed by bombs planted by Nationalist spies or, as Chang's son and successor Chang Hsueh-liang averred, by Japanese.

Generalissimo Chiang Kai-shek now announced that 'the military phase of the revolution has been completed.' A new government was founded, whose purpose was to remove communism and militarism, and to abolish extraterritoriality and the unequal treaties to which China has been subject. The Kuomintang, which controlled the government, elected Chiang President of China on October 9, 1928. The capital was moved from Peiping (formerly Peking) to Nanking. The powerful northern war lords Feng Yu-hsiang and Yen Hsi-shan gave their support to the Nanking government, and Chang Hsueh-liang, Governor of Manchuria, declared his friendship. At the beginning of 1929, China was more nearly unified than it had been for many years.

In July, the Nanking government, basing its action on a charge of Communist propaganda, expelled the Russian officials on the Chinese Eastern Railway, only to be forced, by the end of the year, to retrace its steps. (See MANCHURIA).

During the summer of 1930 bandit armies roamed over the country murdering, looting, kidnapping white men and women, destroying Christian missions and holding missionaries for ransom. That President Chiang Kai-shek (who became a Christian) had transferred the capital from Peiping to Nanking widened the old hostility between north and south. The northern generals, who had given promise of promoting harmony, revolted and revived civil war, while Communist bands also menaced the capital. For a brief time the 'Reds' held Changsha, capital of Hunan; Tsinan, the capital of Shantung, was seized by the northern generals in June but recaptured by the Nationalists in July. During the remainder of 1930, banditry, civil war, executions, and massacres harassed the country.

Although the superior possession of money and supplies enabled the Nationalists to defeat the northern coalition of Feng Yu-hsiang and Yen Hsi-shan, the Communist revolutioners in the south continued their successful resistance in 1931, holding, in March, 200 miles of both banks of the Yangtse River from a point near Sinti, 100 miles above Hankow, to a point about 40 miles from Shasi. On May 4 the Nationalist government announced the abolition of extra-territoriality, to begin from January 1, 1932. The Chinese People's Convention, meeting from May 5 to 17, adopted a new Provisional Constitution increasing the powers of the President of the State Council (in effect, the President of the country). Op-



position to this measure, and charges that President Chiang was endeavoring further to increase his powers, led to increased hostility on the part of the southern faction. This took the form finally, on May 28, of a new 'National Government of China' established in Canton.

In August a catastrophic flood in the valleys of the Yangtse and Hwai Rivers, in the area centering at Hankow, left 15,000,000 persons homeless and facing starvation, and seriously affected another 50,000,000. In the north, in the same month, an abortive revolt by the forces of General Shih Yu-san was quelled and the Communists in Kiangsi, to the south, were being beaten by the Nationalists.

The startling events in Manchuria, starting with the taking of Mukden in September and ending, after Chinchow was taken in January, 1932, and Harbin, in February, in complete Japanese possession of Manchuria and the expulsion of Governor Chang Hsueh-liang (see MANCHURIA) helped to settle dissension within the ranks of the Kuomintang. The Cantonese stopped the advance they had already begun and in a peace conference held in Shanghai in October stated that they would dissolve the Canton government if President Chiang would resign. On December 15 President Chiang took the adroit step of resigning, as did his brother-in-law, T. V. Soong, the only Minister of Finance who had proved himself capable of securing funds to maintain a national government. The Cantonese faction assumed the Nanking government, lessened the powers of the President, and appointed their leader Sun Fo, son of Sun Yatsen, President of the Executive Yuan (equivalent to Premier). After six weeks Chiang and Dr. Soong were welcomed back.

Meanwhile the trouble with Japan over Manchuria—unalleviated by all efforts of the League of Nations and the United States—gave rise in China proper to anti-Japanese expressions, demands for war, and most effectively, in an economic boycott. (See JAPAN).

In January, 1932, when a newspaper in Tsingtao, the chief port of Shantung Province, published anti-Japanese sentiments, Japanese destroyed the offices of the newspaper, the local headquarters of the Kuomintang, and raided the city, holding it for a day before withdrawing. A little later an attack by Chinese on five Japanese monks was given as the excuse for even more overt hostilities in Shanghai. Rear Admiral Koichi Shiosawa, commanding the Japanese fleet off Shanghai, demanded an apology, indemnity, the cess-

ation of the boycott and of all anti-Japanese organizations and expressions. All these were promised, yet the Admiral decided to attack Chapei, the Chinese administered district north of the International Settlement. His ships opened fire and Japanese planes dropped bombs, setting Chapei on fire. The populace fled in terror. Meanwhile Chinese troops fought off the Japanese at Shanghai and also repelled the attack on the Woosung forts 16 miles away, where the Whangpo River flows into the Yangtse.

In the face of actual war which threatened to end in declared war, the foreign nations with interests in China despatched cruisers to the scene. Great Britain and the United States sent notes to both of the countries involved urging that they stop all acts of violence, cease all mobilization and preparation for war; that the combatants withdraw from the points of conflict in Shanghai; that neutral zones be established in the International Settlement, and that negotiations to compose all differences in accordance with the Paris Pact be begun.

By signing a formal truce with Japan May 31, 1933, China tacitly abandoned Manchuria and Jehol to Japan, following a period of conflict which had been intermittent since Sept. 1931. Japanese pressure, however, on North China was continued in 1935, and in the cities of Peiping and Tientsin, and in the Hopei and Chahar Provinces, the principal Chinese officials were turned out and replaced by men acceptable to the Japanese leaders. The Chinese government was reorganized on December 12, 1935, and the presidency of the Executive Yuan—or the Premiership—was taken over by General Chiang Kai-shek, which made him virtual dictator.

In September, 1936, a new set of demands was presented to the Chinese government by Japan. The following month General Chiang reviewed a parade at Nanking consisting of 30,000 soldiers, supported by aviation, anti-aircraft, artillery and tank units. In the budget estimates for 1936-1937 there was an item of \$375,000,000 for military purposes. On December 12, 1936, General Chiang was kidnaped at Sian by General Chang Hsueh-liang, leader of the mutinous troops of Shensi Province. As conditions of Chiang's release, Chang demanded war with Japan and an alliance with Chinese Communists. Later, however, he submitted to pressure from the Nanking Government, releasing General Chiang on December 25, 1936, and

was sentenced to imprisonment and loss of civil rights. The sentence was later commuted.

In 1932 a new standard unit, the yuan or new silver dollar, supplanted the tael.

In 1937 Japan opened an undeclared war on China, attended by terrific airplane bombing of populous cities. In 1941 the Jap. armies held most of the principal cities, railways, ports and seaboard of China. The government of Chiang Kai-shek had moved to Chungking, whence it sealed off the Communists by maintaining a blockade against Yunan, and continued to resist the Japs. The U. S. sent men and goods over the Burma Road, and when this was taken by the Japs, 1942, sent what it could by air; but adequate Allied help was not forthcoming. May 20, 1943, Great Brit. and the U. S. surrendered extraterritorial rights in China. In 1944 Japan struck again—cut China in two. Chiang reorganized his armies and his civil administration; took personal direction of the armies. In late 1944 a Chinese army succeeded in stopping the Jap. drive. During the war the government was forced to move to Chungking. Bitter hostility arose between the Communists and the Chungking government, but following the surrender of Japan in 1945 Chiang Kai-shek succeeded in arranging a conference with the Communist chief, Gen. Mao Tzetung, and harmony was restored.

Consult Latourette's *The Development of China* (1929); Holcombe's *Chinese Revolution* (1930); Lin Yu-tang's *My Country and My People* (1935); Snow's *The Battle for Asia* (1941).

**Chinandega**, city, Nicaragua, capital of Chinandega department.

**Chi-nan-fu, Tsi-nan-fu**; city, China, capital of Shantung. Chi-nan-fu is noted for its silk and glass manufacture.

**China Sea**, a western division of the Pacific Ocean, lying e. and s. of China.

**China Tree**. See **Melia**.

**China Ware**. See **Pottery**.

**Chincha Islands**, three bare, rocky islets, rising 200 feet out of the sea off the coast of Peru, opposite the Bay of Pisco.

**Chinch Bug**, a small, blackish bug with white wing covers, belonging to the family Lygaeidae.

**Chin-chew**. See **Chuan-chou**.

**Chin-chian-fu, Chin-kiang-fu, or Kin-kiang**, city and treaty port, China, is situated on the Yang-tse-kiang, at its junction with the Grand Canal. The chief exports are beans and bean cake, peas, wheat, groundnuts, dried lily flowers, medicines, and sesamum

seed; imports include cotton and woolen goods, kerosene oil, sugar, cigarettes, soda ash, and timber. It was almost demolished during the Taiping Rebellion (1851-64); p. 200,000.

**Chin-cheu**. See **Chuan-chou**.

**Chinchilla**, a South American rodent, well known for its soft grey fur.

**Chinchona**. See **Cinchona**.

**Chinda, Count Sutemi** (1856-1929), Japanese diplomat. He was Ambassador to the United States from 1911 to 1916 and to Great Britain, 1916-20; became privy counselor and grand steward to the Prince Regent in 1920.

**Chinde River**, Portuguese East Africa, the best entrance to the Zambezi.

**Chindwara, or Chhindwara**, district, Central Provinces, India, with an area of 4,630 sq. m.; p. 491,835.

**Chindwin**, two districts in Upper Burma, India.

**Chindwin River**, a tributary of the Irrawadi, has its source in Upper Burma.

**Chinee**. See **Chinu**.

**Chinese Art**. In bronze the Chinese artists of 1000-500 B.C. yield to none in massive force of conception and perfect craftsmanship. Less powerful but more graceful work was done till some 400 A.D. An oddly blank period follows, then a revival with the Sung dynasty in 960, a period of richly decorative work but less forceful and sincere in the Ming period (1368 onward), thence a swift decline. In sculpture, the Chinese have done little; nor in engraving, despite the instinct for line shown in their painting.

Painting is the glory and true expression of China. Its history, either on wood or walls, or with its delicate, penman-like brush work on silk or less often paper, dates back to the 3d century B.C. But no named painter emerges till the 2nd century A.D.; in the 4th we have the first great artist, Ku K'ai-chih, by eminence a portraitist. In the early T'ang dynasty (from 618 A.D.), Buddhism flooded China, becoming the same dominant influence in art as Christianity in Europe. The great name in Chinese art is Wu Taotzu, the one master in all fields, though no certain work of his is extant; only Japanese copies preserving even his supreme religious painting, Buddha's Nirvana. In this age landscape was firmly delimited. Two natural schools developed: the romantic and suggestional one of the South, headed by the poet-painter Wang Wei; and the realistic one of the North whose great name is Li Ssü-hsun. The an-

archic Five Dynasties (907-960) nourished two exquisite nature painters, Hsü Hsi and Hsuan Ch'uan.

The reunion under the Sung dynasty (968-1280) ushered in China's Periclean age of freedom and varied personal greatness, 'glorious in art as in poetry and philosophy.' Landscape painting rose to its height of feeling and expression. Supreme among Sung artists is Li Lung-mien, the religious painter. This greatness lasted through the Mongol dynasty (1280-1368), Chao-Meng-fu belonging to both and ranking with the greatest names. In the Ming era (1368-1644), some great men, chiefly Lin Liang, still maintained the grand old traditions; but on the whole their force and simplicity were gradually replaced by elaboration and elegance, as with Kiu Ying. The four masters of landscape, called 'the four Wangs,' along with Yun Shou-p'ing and Wu Li, bear high rank. For Chinese architecture, see the article ARCHITECTURE. Consult Brinkley's *China: Its History, Art and Literature*; Tredwell's *Chinese Art Motives* (1915); Ferguson's *Outlines of Chinese Art* (1919).

A great awakening has taken place in Chinese art in the last generation. In modern painting we no longer find those dim ethereal landscapes, those familiar pagodas, temples, sunsets, etc. Instead we find formless peasant women with their children, naked coolies, fierce looking bandits, students in brawls with the police over free speech, opium-smoking bourgeois, villages in shambles after an invasion. The western influence, not of Europe but of westernized Japan, has finally made itself felt in the young Chinese painters. The human body has become the great artistic inspiration, but this revolution did not take place without opposition. As late as 1920 one young painter was arrested for using nude models. Now his exhibitions are attended by large crowds. Furthermore, the young generation of artists did not free itself until very recently from the ancient ideal of metaphysical beauty as opposed to the contemporary physical beauty. The new painting was characterized up to 1930 by an 'art for art's sake' attitude, and all the emphasis was laid on technique. Now, with the awakening of a social consciousness, the attitude of 'art for life's sake' has been rapidly developing. The dignity of labor has been realized and for the first time in its history Chinese painting has turned attention to man as a living organism.

In December 1935 there took place in

London the largest exhibit of the treasures of Chinese art ever assembled in one place—twenty-one thousand separate pieces, representing 35 centuries of artistic creation. Among the most interesting objects of the exhibition were: some bronze vessels and oracle bones of the Shang and Yin Dynasty (about 1766-1122 B.C.); a famous 38-foot landscape scroll called 'Ten Thousand Miles of the Yangtze,' painted by Hsia Kuei in the early 13th century; and a Buddhist stone carving of the 6th century.

**Chinese Immigration.** See **Immigration.**

**Chinese Language and Literature.**

The speech and the written words of the Chinese differ more widely than those of any other people. The former addresses itself, like all other languages, to the mind through the ear; the latter speaks to the mind through the eye, not as words, but as symbols of ideas. The words and the names of the written characters are all monosyllabic, and are inconjugable and indeclinable, without inflection or change of any kind. Chinese has never advanced to anything like agglutination even (see **PHILOLOGY**); but its written characters existed probably more than 5,000 years ago. These characters are divided into six classes: (1) pictorial characters, originally rude pictures of objects; (2) indicative characters, intended by their form and the relation of their parts to suggest to the reader the idea in the mind of their makers; (3) composite characters, made up of two or more characters; (4) inverted characters, formed from others by inversion; (5) borrowed characters, used in other than their proper signification; and (6) phonetic characters, of which one part has a phonetic use, and indicates, exactly or approximately, the name of the compound, and the other part the category of meaning which it conveys.

The monosyllabic utterances are few. According to the tone in which the monosyllable is pronounced, its meaning is different; and this renders what we call a 'good ear' desirable in learning the speech of China. In 1917 an important step in the cause of popular education in China was taken by the abolishing of the old classical language and the adoption of the *pei hua* ('spoken language') for all literary purposes. This has greatly facilitated the study of the language. The vastness and variety of the Chinese literature may be realized from a brief analysis of the contents of the catalogue *raisonné* of the works collected by an order of the Kienlung reign in 1722, to be printed or reprint.

ed as a great national library. The catalogue is arranged in four divisions under the name of *Kû*, 'arsenals,' or 'magazines': the first, in 44 chapters, containing works on the classics and dictionaries necessary in the study of them; the second, in 46 chapters, works on history; the third, in 57 chapters, works on philosophy and the arts; and the fourth, in 53 chapters, works on poetry and *belles-lettres*.

The last four centuries have been very productive of novels, hundreds of which have been preserved and reprinted in cheap editions. Many of these have little literary value, but the best of them rank among the world's masterpieces. The literary revolution which took place in China in 1917, when it was declared that *pei hua* ('the spoken word') should be the literary medium for the future, was the beginning of a new era of creative and constructive literature. Practically all of the most recent publications have been in the vulgar and the opposition to *pei hua*, at first violent, has gradually so died down as to be negligible. Consult Giles' *Chinese Literature*; Wilson's *The Literature of China*; Marten's *The Lore of Cathay*.

**Chinese Turkestan.** See **Turkestan**.

**Chinese Wall.** See **Wall, Great, of China**.

**Chinese Wax.** See **Wax**.

**Chinese White.** See **Pigments**.

**Chin Fly**, a species of bot fly, a parasite of the horse, mule, and other equines. See **BOT FLY**.

**Ching**, one of the nine divisions of the Chinese empire under the Hia or Hsia dynasty (2205-1766 B.C.)

**Ching-chou-fu**, or **Tsing-chou-fu**, city, Shan-tung, China; known for the coal mines in the vicinity; also for its pottery; p. 35,000.

**Ching Ikuang, Prince** (1839-1917), Chinese statesman; held many offices; was president of the Grand Council from 1903 to 1912, when the abdication of the Manchus brought about his retirement from public life.

**Chingleput (Chengelpat)**, district on the coast of the Bay of Bengal, Madras Presidency, India; p. about 1,400,000, almost all Hindus.

**Chingleput, Chingalput, or Chengalpat**, town, Chingleput district, Madras. A 16th-century fort is of historic interest as the active scene of the struggle between the French and English under Clive; p. 12,000.

**Ching-te.** See **King-te-chen**.

**Ching-tu.** See **Cheng-tu**.

**Ching-tzu-kuan**, customs station in Ho-

nan, China, on the Tan River, at the head of navigation in winter time, on the route from Hankow to Sian-fu.

**Chiniot**, town, India, in the Jhang district, Punjab. It is famous for its wood carving, masonry, and brasswork. The town is very old; p. 17,000.

**Chinkara**, or **Indian Gazelle** (*Gazella bennetti*), a species of gazelle known as the ravine-deer, found on the plains of Central and Northwestern India. It is a light chestnut in color, measures about 2 ft. in height at the shoulders, and is exceedingly swift.

**Chin-kiang-fu.** See **Chin-chiang-fu**.

**Chin-ling**, a branch of the Kwen-lun Mountains in China, running w. by n. and e. by s. through Shen-si, and dividing the higher waters of the Wei and Han Rivers. Its main pass is s.e. of Sian-fu, *via* Shang-chou, to Lung-chü-chai. The highest peaks, Ta-pai-shan and Kwang-tang-shan, are over 12,000 ft. high.

**Chinnampo**, city and port, Korea (Chosen), at the mouth of the Daido-ko River. It was opened to foreign trade in 1897. The harbor is deep and wide, affording good anchorage to large steamers, and has a large dock to which vessels can be moored during the coldest weather, when the harbor is blocked by ice; p. 22,667.

**Chinon**, town, France. It is an ancient town, with a castle which formed a royal residence from the 12th century until the time of Henry IV. Rabelais was born here, and here Joan of Arc had her first meeting with Charles VII.; p. 6,000.

**Chinook**, the warm, dry wind encountered on the leeward side of mountain ranges, common in the Rocky Mountains, and in Switzerland, where it is known as the föhn. As the air rises on the windward side of the mountain it expands, cools, and loses moisture with the decrease in pressure. This dry, cool wind, as it descends on the leeward side of the range, regains its heat through the contraction due to increased pressure. The high temperatures are confined to the valleys, and occur in streaks or pockets, so that a traveler frequently passes suddenly from a very warm to a very cold atmosphere.

**Chinooks**, an Indian tribe formerly numerous and powerful in British Columbia and as far s. as Oregon. The small number now remaining, nearly all of mixed blood, are on reservations in Washington. The Chinook language served as the basis of the so-called 'Chinook jargon,' which became the *lingua franca* throughout a great part of

Oregon, Washington and British Columbia. Consult Curtis' *North American Indian* (vol. VIII, 1911).

**Chinquapin** (*Castanea pumila*). See **Chestnut**.

**Chins**, a people of Burma, living near the borders of Assam, Manipur, and Bengal. They are a barbarous and turbulent people, divided into many tribes and clans and have proved the most troublesome of all the border races. The southern clans have a curious habit of tattooing the women's faces with closely set blue lines.

**Chin-sha**, or **Kin-sha-chiang** ('River of Golden Sand'), the name given by Chinese to that part of the Yangtse-Kiang River which forms the boundary between China and Tibet.

**Chintreuil, Antoine** (1814-73), French landscape painter, a pupil of Corot. His paintings show Corot's influence, having the same effect in mistiness and shadow. *Thicket With Deer*, *Rain with Sunshine*, and *Space* are in the Louvre.

**Chintz**, the English word, whose French equivalent is *cretonne*, for drapery prints. The Hindu word *chint*, meaning many colors, was originally applied to painted or stained calicoes imported from India. In England chintzes are usually glazed and not less than five colors are used in their design.

**Chinu**, or **Chinee**, town, Colombia. It was founded in 1534 on the site of an ancient Indian town; p. 12,551.

**Chioggia** (Chiozza), fortified seaport and episcopal see, Italy, near Venice. It is connected with the mainland by a stone bridge and is protected against the Adriatic by a gigantic stone mole (*murazzi*) built in 1774-82, at a cost of \$3,900,000. The principal buildings are the cathedral (1633) and corn market (1322); p. 35,052.

**Chios**, **Khios**, or **Scio** (Turkish *Sakiz-adası*), Greek island in the Ægean Sea, mountainous (St. Elias, 4,100 ft.), picturesque, and fertile. The climate is excellent, the mean annual temperature being 68°F. Chios shared the fate of the Byzantine empire, and was conquered by the Turks in 1566. As a result of the Balkan Wars, in 1913 Chios was given with other Ægean Islands to Greece, who at the close of the World War was allowed to retain it. Homer is said by some to have been born here; p. 75,680.

**Chipewyans**, a tribe of North American Indians, members of the Athabascan family, of which they constitute the central and most important division. All the groups between

the Rocky Mountains and Hudson Bay, as far s. as the parallel of the Churchill River, are strictly speaking, Chipewyans.

**Chipmunk**, an American name for the ground-squirrels of the genus *Tamias*. They are small animals characterized by the possession of cheek pouches. The tail is not bushy, but flat or feather-like in form. Chipmunks dwell by preference in rocky places, or in thickets, where they can hide quickly. In the fall they dig long burrows, enlarged and occupied by successive families for several years. Here they store supplies of small nuts, kernels of corn, and the like, to serve as winter food. When cold weather comes they retire to these underground homes and there remain till spring, venturing out occasionally on warm days. The common Eastern chipmunk, *T. striatus*, is reddish brown in color, with two white stripes bordered by black and a plain black stripe running down the middle of its back; that most common in the West is *T. quadrivittatus*, marked by four distinct dorsal bands. Other species and varieties frequent the Rocky Mountains and the Pacific slope.

**Chippendale, Thomas** (c. 1710-1779), English cabinet maker. He moved to London with his father, also a cabinet maker, and established a large cabinet-making and upholstery business. In 1752 he published the first edition of his book, *The Gentleman and Cabinet Maker's Director*. After his death, his son carried on his work. Characteristic details of the style in chairs, upon which Chippendale's fame chiefly rests, are cabriole legs (from Holland), often finished with claw and ball feet; the strap or ribbon back (from France), and lattice-work designs (from China). His favorite wood was dark mahogany. Consult Clouston's *Chippendale Period in English Furniture* (1910); Blake's *Chippendale and His School* (1912).

**Chippeways**, a branch of the Algonquin family of North American Indians. See **Ojibways**.

**Chippy**, or **Chipping Sparrow**. See **Sparrow**.

**Chiquinquira**, town, Colombia, over 8,000 ft. above the sea; 80 m. n.e. of Bogota. It contains one of the finest churches in the country, whose miraculous image of the Virgin makes it a resort of pilgrims; p. 22,502.

**Chiquitos**, collective name of a large group of South American Indians in Bolivia. Their Spanish name, Chiquito, 'very small', seems to have reference to their huts, which have very low doorways. There are as many as

40 tribes, grouped into 7 divisions, each with its own language. They are a merry light-hearted people, given to singing and dancing. They cultivate white and yellow cotton and indigo, with which they prepare their striped parti-colored garments. They are communists.

**Chiretta**, or **Chirata**, a dried plant (*Ophelia chirata*) closely resembling gentian in its medicinal properties, which grows in the mountains of North India. It is collected when in flower. Chiretta is a bitter tonic and a cholagogue.

**Chiromancy.** See **Palmistry**.

**Chiron**, the wisest and kindest of the Centaurs, was the son of Cronos and Philyra, and dwelt on Mount Pelion. He won such renown for his skill in the arts that many of the Greek heroes came to him for instruction. He saved Peleus from the wrath of the other Centaurs and aided him in his marriage to Thetis. Hercules accidentally wounded Chiron with a poisoned arrow, causing him such torture that he resigned his immortality to Prometheus. Zeus placed him among the stars.

**Chiropractic**, a system of treatment of disease, through the adjusting of articulations of the human body, particularly those of the spine, with the object of relieving pressure or tension upon nerve filaments. The operations are performed with the hands, no drugs being administered. Its adherents claim that chiropractic is not a branch of medicine, being inherently and fundamentally antagonistic to the basic principles of that science. It differs, also, from osteopathy in that it aims solely to adjust the cause of the trouble, and avoids treatment of the disease itself.

Chiropractic diagnosis consists properly of three parts: vertebral palpation, nerve tracing, and symptomatology. Adjusting, which is the only means of cure used by the chiropractor, is the art of correcting by hand the malpositions of subluxated vertebrae. Its prime object is the removal of impingement on the nerves.

**Chiroptera.** See **Bat**.

**Chiru**, **Orongo**, or **Tibetan Antelope** (*Pantholops hodgsoni*), an antelope nearly allied to the saiga is found at great elevations in Tibet and East Turkestan. It is about 30 inches high and has thick close fur of a pale fawn color. It is shy and difficult to approach, and is chiefly remarkable for the swollen nostrils and long, straight horns of the male.

**Chisel**, a straight-edged tool formed from

the flattened end of a steel bar, and used for cutting wood, metal, or stone. *Cold chisels*, used for metal or stone, have the cutting edge sharpened on both sides, the ground faces meeting at not less than a right angle. *Carpentering chisels* have only one side sharpened, the beveled face meeting the flat side at an angle of about 20°. *Carving chisels* have both sides sharpened with a razor-like edge, so as to make a light, clean cut without bruising the wood. *Turning chisels* have an edge on one face only.

**Chiswick**, urban district, Middlesex, England, 6 m. s.w. of Hyde Park. It contains some historic residences, including Chiswick House, Walpole House, the prototype of Miss Pinkerton's school in *Vanity Fair*, and the house occupied by Hogarth. In the churchyard are buried William Hogarth, William Kent, the Duchess of Cleveland and James McNeil Whistler; p. 40,942.

**Chita** or **Tchita**, capital and chief town of Transbaikalia, East Siberia, is situated on a plain where the river Chita falls into the Ingodá; 400 m. e. of Irkutsk. It is an important trading center and its growth in recent years has been enormous. It was to Chita that the Decembrists were sent in 1825; p. 75,000. See **RUSSIA: History**.

**Chitaldrug**, or **Chitaldroog**, district in Mysore, India, with an area of 4,022 sq. m. Insufficient rainfall and stony soil make the district liable to periodic drought and famine; p. 560,000.

**Chitaldrug**, chief town in Chitaldrug district, India. The town has extensive fortifications, dating from the 18th century, and a series of ancient subterranean chambers containing shrines, baths, and pedestals; p. 6,000.

**Chitin**, chemical substance present in the skeletons of insects and crustaceans. It is an amorphous white substance, containing nitrogen but free from sulphur. Its resistance to acids and alkalis is very great; it is unaffected by digestive ferments, by water, hot or cold, by alcohol or ether. It may be dissolved by strong mineral acids (hydrochloric or sulphuric). Chemically it is regarded as a derivative of carbohydrates, and may be split up into sugar and glycosamin.

**Chiton**, the Greek garment corresponding to the Roman tunic. It varied greatly in length, color, border decoration, and material.

**Chiton**, a genus of marine molluscs. The body bears eight dorsal shellplates, usually so jointed that the animal can roll itself up. There are numerous gills, and the foot is long, with a flat, creeping surface.

**Chitral**, a native state in India, which is inhabited by turbulent hillmen. The cultivation of the soil, order, and general prosperity have greatly increased under British supervision. The native chief (the mehtar) controls internal affairs. The capital is Chitral, which commands the easiest and most important passes over the Hindu-Kush; p. of the state about 80,000.

**Chittagong**, district, Bengal, India, consisting of a narrow strip of country lying between the Bay of Bengal and the Arakan hill tracts. It is hilly and near the coast is somewhat malarious; p. 1,611,422.

**Chittagong**, town, Bengal, India, near the head of the Bay of Bengal. It is an important port, shipping rice, jute, and tea; p. 36,030.

**Chittagong Hill Tracts**, district in the Chittagong division of Eastern Bengal and Assam, India. It is covered with dense jungles, the haunt of the elephant, rhinoceros, and tiger; but the interior is gradually being opened by roads. The majority of the people are Chakmas and Maghs (Buddhists); p. 173,243.

**Chittagong Wood**, the wood of the *Chickrassia tabularis*, a tree indigenous to the Chittagong Hill Tracts, India. It is called Indian mahogany and is much used in India for furniture, being light, cheap, durable, and handsome.

**Chittam Bark**. See **Cascara Bark**.

**Chittenden, Russell Henry** (1856-1943), American chemist and educator. He served on various commissions concerned with the chemistry of foods. His published works include *Physiological Economy in Nutrition* (1903) and *Development of Physiological Chemistry in the United States* (1930).

**Chiusi**, (ancient *Clusium*), town and episcopal see of Italy. It was one of the leading cities of the ancient Etruscans, and has extensive tombs, with many Etruscan inscriptions; also an Etruscan museum, a 10th century cathedral, and remains of mediæval walls.

**Chivalry**, the knightly system of the Middle Ages, particularly in its more ideal aspects. It is practically synonymous with knighthood, but with this difference—that as generally employed it denotes the ideas and customs prevailing among the noble caste rather than the estate itself. It embraced the knight's duty to God, to his lord, and his lady. War was his chief business, honor and religion the sanctions of his actions, and to do the pleasure of his lady, his chief joy.

Chivalry was based upon the military and territorial system of the Teutonic nations which distinguished between men of noble birth and the rest of the world; but though its usage and honors were not allowed to any of low degree, its maxims, alike in what they enjoined and what they condemned, were felt as a vital force in the entire social structure. It was powerful both for good and evil. In so far as it tended to foster a contempt for inferiors its influence was bad; in so far as it upheld courtesy, honor, and religion, it was good. In England the term chivalry was used in a technical sense to denote military tenure, or tenure by *knight's service*. With the introduction of new and foreign elements into war and society, the employment of artillery and infantry which reduced mail-clad cavalry to an inferior position, and the rise of democracy, came the decline of chivalry. With the decay of feudalism, it too passed away. See **FEUDALISM**; **KNIGHTHOOD**.

**Chive**, or **Cive** (*Allium schænprasum*), a perennial plant native to Europe and the Northern United States, allied to the leek and the onion. It grows to a height of six or eight inches, bearing narrow, hollow leaves and violet-colored flowers. The green leaves are used in soups, salads, and for seasoning.

**Chizerots**. When the Moslem Army under Abdur-Rahman was routed by Charles Martel at Tours (732), many Saracens remained in certain districts of France, where their descendants are still found. Some of these call themselves Chizerots, and some take the name Burins.

**Chladni, Ernst Florens Friedrich** (1756-1827), German physicist. His work on *Sound* (*Akustik*) is the basis of the mathematical theory of vibrations yielding musical tones.

**Chlamydomorphus** ('cloak-bearer'), a genus of small armadillos, remarkable for the peculiar nature of their armor. The best-known species is the pichichiago which has the head and body covered by a dorsal shield made of four-sided, horny plates, beneath which lie thin plates of bone. This shield is only attached along the median line of the back, and is free at the sides. It is a burrowing animal about five inches long, and inhabits western Argentina.

**Chlamys**, a short, oblong mantle, generally of wool, worn by the ancient Greeks, and adopted to some extent by the Romans of the Empire.

**Chloasma, Liver-spot, or Melanoderma**, a condition of the skin characterized by

the presence of yellowish brown patches. It is not an uncommon result of continued irritation of the skin, as in the use of certain drugs or in sunburn or it may be an after effect of various skin diseases.

**Chloë**, a shepherdess in the Greek romance, *Daphnis and Chloë*, by Longus. The name has come to be applied to many similar bucolic characters. It appears in Fletcher's *Faithful Shepherdess* and in the more recent ballet *Daphnis and Chloë*, with music by Ravel and choreography by Fokine.

**Chłopicki, Jęsef** (1771-1854), a Polish soldier and patriot, was born in Galicia. At the second Polish insurrection (1830) he was made dictator of Poland, but resigned after six weeks' tenure.

**Chloral** ( $C Cl_3 CHO$ ), is the commercial name for Chloral Hydrate. Chloral is an oily fluid but readily unites with water to form chloral hydrate. Chloral Hydrate, commonly called and sold as *chloral*, occurs in colorless crystals or white cakes, of pungent odor and taste. It is a hypnotic, to be used under the guidance of a physician. The sleep produced is frequently attended with hallucinations and other disagreeable symptoms. Chloral is known among the criminal class as 'knock-out drops.' It possesses antiseptic properties, and will preserve animal tissues from putrefaction. *Chloral Camphor*, an oily fluid is employed locally as a counter-irritant in neuralgia, etc.

**Chlorates.** See **Chloric Acid**.

**Chloric Acid** ( $HClO_3$  or  $ClO_3OH$ ), known only in its forty-per-cent. aqueous solution or its salts. It is a colorless liquid with a strong, pungent odor. It has bleaching properties. Chlorates (chiefly potassium) are used in preparing oxygen, in pyrotechnics, for detonators, in making matches, and in general as an oxidizing agent. See **ELECTRO-CHEMISTRY**; **POTASSIUM CHLORATE**.

**Chloride of Lime, Chlorinated Lime.** See **Bleaching Powder**.

**Chlorimetry**, the estimation of free or available chlorine (loosely combined) present in chlorine water, Javelle water, or Labarraque's solution ('bleach') or bleaching powder (chlorinated lime).

**Chlorine** ( $Cl$ , 35.45), an element of the halogen group, discovered by Scheele in 1774. Chlorine is a greenish-yellow gas, 2.5 times heavier than air; of suffocating, irritating odor, attacking the respiratory organs and producing, when inhaled in sufficient quantity, symptoms of pneumonia. It occurs in nature in the combined state only, chiefly

with sodium as common salt, less extensively as carnallite and sylvine; also in still smaller quantities in the form of chlorides of silver, copper, and magnesium. Chlorine combines directly with all elements excepting argon, helium, nitrogen, carbon, and oxygen. With hydrogen, it combines slowly in diffused sunlight, and explosively when exposed to direct sunlight. Most metals combine at ordinary temperature with chlorine—copper leaf, phosphorus, powdered bismuth, arsenic, and antimony igniting. It is by means of this gas in solution that gold and platinum are dissolved (*aqua regia*). A hydrogen flame burns in an atmosphere of chlorine, and *vice versa*, with production of hydrogen chloride. Chlorine displaces iodine and bromine from their compounds with the metals; and it liberates oxygen from water when exposed to the light, or in the presence of substances which combine with oxygen. On this, the bleaching action of chlorine on organic colors depends.

Liquid chlorine is prepared in large quantities, and used in detinning iron for making stannous chloride; also in the extraction of gold from its ores. Medicinally, chlorine is administered in solution as chlorine water, which is defined by the U. S. Pharmacopeia, under *Aqua Chlori*, as an aqueous solution, containing, when freshly prepared, about 0.4 per cent. of free chlorine. It should be prepared fresh, as needed, since upon standing decomposition ensues. Chlorine is a powerful disinfectant, and is usually employed in the convenient form of chloride of lime (chlorinated lime). See **HYDROCHLORIC ACID**.

**Chlorite**, a soft, dark-green, scaly mineral which sometimes occurs in such abundance as to form rock masses. These, known as chloric schist, are usually fissile and slaty, and often contain crystals of magnetite and tourmaline. They are found principally in regions of metamorphic rocks, with hornblende schist, mica schist, and so on. The old term 'greenstone' was applied to dark green decomposed rocks, which owe their color to secondary chlorite. The green color is due to ferrous iron.

**Chloroform** ( $CHCl_3$ ), as used in medicine, possesses a hot, sweetish taste, and pleasant odor. It is not inflammable. It was discovered simultaneously by Guthrie of Sackett's Harbor, N. Y., Soubeiran of France, and Liebig of Germany in 1831, and was first used as an anæsthetic by Simpson of Edinburgh in 1848. The presence of impurities renders administration of chloroform, through inhalation, dangerous. To test for



impurities, chloroform, when shaken with distilled water, should not affect either litmus paper, a solution of silver nitrate, or potassium iodide.

Chloroform possesses excellent solvent properties for rubber, resins, fats and oils. It also prevents alcoholic, lactic, and other fermentations. Medicinally, chloroform is used in aqueous and alcoholic solution, in emulsions, and in liniments. Externally it is an irritant, causing blistering if confined on the skin. Small doses produce warmth and burning in the stomach; larger doses, gastro-enteritis. As an anæsthetic it first produces excitement of the brain centers, followed by gradual unconsciousness; then of the spinal cord centers, followed by paralysis, loss of sensation and of the reflexes. The lower centers, or those parts of the brain chiefly concerned in involuntary actions, as breathing and heart movements, are only slightly affected. If administered too long or excessively, the vaso-motor system becomes paralyzed, and death ensues.

**Chlorophyll**, to which the green color of leaves and the other exposed parts of plants is due, occurs in minute green spherical or lenticular granules. It belongs to the class of vegetable pigments called chloroplastids, which occur in roots, leaves, and fruits of a yellow or orange (chromophyll) or green (chlorophyll) color. These plastid pigments are distinguished from all other color-bodies present in plants by their insolubility in water and solubility in ether, chloroform, petroleum ether, etc. The formation of chlorophyll seems to depend upon the presence of magnesium and iron, although the latter is not present in the pure substance. Chlorophyll plays a very important part in the synthetic processes of plant life, its functions being, under the influence of sunlight, to assimilate the carbonic acid of the atmosphere, converting it into carbohydrates with simultaneous evolution of oxygen. Flowers give off carbonic acid, while leaves absorb this. A chemical transformation of chlorophyll causes the color changes which take place in leaves in autumn.

Aqueous solutions of chlorophyll give characteristic absorption bands in the spectrum, their position depending on the dilution of the solution. Solutions of chlorophyll in ether, alcohol, or benzol are bright green in transmitted light, while in reflected light they show a red to blue-red fluorescence. It may be prepared by extracting ground leaves with wood spirits. The extract, after concentrating, is

shaken with water and petroleum ether. The latter, which dissolves the chlorophyll, is separated and distilled off, leaving a dark green, amorphous mass, which constitutes the commercial article. Chlorophyll is largely employed in coloring foods, candies, and liqueurs.

**Chlorosis** (Greek *chloros*, 'green') is a form of anæmia occurring in young girls that gets its name from the characteristic tinge of paleness which accompanies it. 'Green sickness' was the name formerly applied to it. Pathologically, it is marked by a deficiency of hæmoglobin, often to 40 or 50 per cent. of the normal amount, and a consequent failure of nutrition in all parts. The disease is most likely to show itself between the 14th and 17th years, soon after puberty is reached; but any special strain on the system may bring it on at a later date. Lack of proper exercise and of fresh air, the use of improper food, and emotional and nervous disturbances are important factors. See ANÆMIA. The term is also applied to a disease of plants, in which there is a lack of green coloring.

**Choate, Joseph Hodges** (1832-1917), American lawyer and diplomat, cousin of Rufus Choate, was born in Salem, Mass. In 1859 he was admitted to membership in the famous firm which subsequently became Evarts, Southmayd & Choate and he eventually won a position at the American bar comparable to that of his kinsman before him. He appeared as counsel in many noted cases, took a prominent place in politics, and was U. S. Ambassador to Great Britain, 1899-1905, where he gained immense popularity, and did much to cement the kindly feeling between this country and Great Britain. He published: *Abraham Lincoln and Other Addresses in England* (1910); *American Addresses* (1911). Notwithstanding his advanced years, Joseph H. Choate took an energetic part in the entertainment of the British and French war envoys to America in May, 1917; and these activities hastened his death, which occurred suddenly, from heart failure, on May 15, 1917. He ranked as one of the noted orators of his times, and both his public speeches and legal battles attracted wide attention.

**Choate, Rufus** (1799-1859), American lawyer and political leader, was born in Ipswich, Mass. He became one of the ablest and most eminent lawyers in the history of the American bar. Though he generally refused to accept public office, he was deeply interested in public affairs, and was often called

into consultation by political leaders, with some of whom, such as Daniel Webster, he was intimate. He took high rank as a brilliant debater on the Whig side; was conspicuous particularly as an advocate of protectionism, and vigorously opposed the annexation of Texas. Consult *Works of Rufus Choate*, with a *Memoir* (2 vols., ed. by Brown); Whipple's *Recollections of Rufus Choate*; J. H. Choate's *American Addresses*.

**Chocolate.** See **Cocoa**.

**Choctaws**, (properly **Chaktas**), an Indian nation, one of the chief members of the Muskogean family. Akin to and formerly in alliance with the Chickasaws, these two nations originally occupied the eastern side of the Mississippi, between its Ohio and Yazoo affluents. The Choctaws were more to the south, holding both banks of the Yazoo till the year 1830, when they ceded their hunting grounds to the United States. They are now settled chiefly at Union Agency, Oklahoma, where they number about 16,000.

**Chodowiecki**, **Daniel Nikolaus** (1726-1801), Polish painter and engraver, called 'the German Hogarth.' Nearly every new artistic book of his time was illustrated by him, notably several of Shakespeare's plays, *The Vicar of Wakefield*, *Don Quixote*, the works of Voltaire, Lavater, Schiller, etc.

**Choga**, or **Kioga**, a lake in Uganda Protectorate, at an elevation of 3,320 ft. Area, 800 sq. m. It is traversed by the Victoria Nile, and receives the waters of the Seziwa.

**Choir.** Properly, that part of a church appropriated to the singers. In the earlier buildings it extends from the apse into the nave, and is architecturally a part of the latter, distinguished only by a slightly raised platform and a low barrier; it was occupied by the lower clergy. Later it included the entire upper end of the church, and as an architectural term it usually has this meaning, regardless of the use to which the space is put. It was reserved for the canons, priests, monks, and choristers. In cruciform churches the choir is sometimes beyond the transepts, sometimes between them, and in a few cases extends into the nave. The term choir is also applied to the body of singers assisting in, or entirely performing, the vocal music of a church service, whether of four parts or a chorus. A choir singing unaccompanied is termed a *cappella*, the method employed in the Eastern Church.

**Choiseul**, **Etienne François, Duc de** (1719-85), French statesman. While Minister of Foreign Affairs, he adopted a vigorous

policy, and secured the alliance of Charles III. of Spain against the naval supremacy of England and her predominance in America. But the Peace of Paris (1763) concluded a war disastrous to both France and Spain. Choiseul's policy during the years 1763 to 1770 was to strengthen the bonds between France and Spain, to unite all Bourbons, and, after careful preparations, to recover from England some of the territories ceded by the Peace of Paris. He also aided Madame de Pompadour and the Parliament of Paris to expel the Jesuits from France. During his tenure of power, Lorraine was united with France and Corsica was annexed.

**Choisy-le-Roy**, town in France near Paris. In 1682 Mlle. de Montpensier built a château here, which was later used by Louis xv. as a residence. Rouget de l'Isle, author of the *Marseillaise*, died here in 1836; p. 15,000.

**Choke-cherry.** See **Cherry**.

**Choke-damp**, or **After-damp**, is the name given to carbon-dioxide gas when present in the air of caves, wells, and mines. In such circumstances it is chiefly produced in dangerous quantities by the explosion of fire-damp (methane) of coal dust with air, and, as it is irrespirable and poisonous, is the main cause of the deaths following an explosion. See **CARBON**; **MINING**.

**Choking**, suffocation by obstruction in the windpipe, preventing the passage of air to the lungs. The cause of obstruction may be a substance drawn directly into the windpipe, or it may be a substance lodged in the gullet, or a growth in the surrounding tissue that compresses the windpipe. The choking caused by compression from outside is more particularly known as strangling. See **ASPHYXIA**; **STRANGULATION**.

**Cholagogues** are drugs that increase the flow of bile. See **PURGATIVES**.

**Cholera**, **Asiatic**, a deadly parasitic epidemic and epidemic disease, characterized by acute diarrhea, vomiting, feeble circulation, coldness, cramps, and collapse. The parasite is the *comma bacillus*, discovered in 1883 by Koch, and so called on account of its shape. It flourishes in a damp, warm soil. Long drought kills it, or so diminishes its number that an epidemic dies away, to return perhaps with the next rainy season. Some hold that the home of cholera is in Lower Bengal, about the delta of the Ganges; others regard it as endemic in every province in India. In China, about the delta of the Yang-tse-kiang, it appears every year with perfect regularity; and it often arises about the delta of the

Nile at a corresponding period. From the places named it spreads epidemically, its spread corresponding with the lines of commerce and pilgrimage, such as the routes to Mecca, and it proves fatal in 50 to 55 per cent. of those affected. It is principally a water-borne disease. The usual cause of an epidemic is the entry of the bacilli into water which is used for drinking purposes or to wash cooking utensils. The disease is also spread by infected articles of food, and the germs may be carried by flies.

The incubation period varies usually from two and one-half to five days, but in epidemics the disease sometimes appears 24 hours after the opportunity for infection, and sometimes not until 10 to 14 days later. The victims of cholera are those whose intestines are weakened by previous illness, bad feeling, exhaustion, or excess in eating or drinking. Thus, in affected areas, the European population suffers vastly less than do the natives, owing to its cleaner habits and its better sanitary arrangements; and of those Europeans who are attacked, an undue proportion belongs to the visiting seafaring population.

Treatment is either prophylactic or curative. Prophylactic treatment consists in care of the general health while in districts where cholera is endemic, or during the course of an epidemic elsewhere. All water for drinking and cooking purposes should be boiled, and all unripe and overripe fruit should be avoided. The first step in the *curative treatment* of cholera is to stop the initial diarrhoea. This is followed by treatment for relief of cramps and the attacks of vomiting, and by treatment for building up strength.

**Cholera Infantum** (cholera of children). An infectious, usually fatal, disease, resembling Asiatic cholera, and generally attacking the bottle-fed infants of the poor. It is one form—the severest, but not the most frequent—of acute intestinal poisoning. The infection commonly comes from impure milk, and may be due to some poison developing in the milk before digestion, or in the stomach or intestines after the milk is taken. See Holt's *Diseases of Infancy and Childhood* (1907).

**Cholesterin** is a complex compound of an alcoholic character found in bile, gall stones, nervous tissues, and wens. It forms pearly crystals.

**Choliambus**, or halting iambus, is a line of poetry in which the iambic movement is continued up to the last foot, and there re-

placed by that of a spondee or trochee. The term is applied chiefly to ancient prosody.

**Cholon**, province and municipality, French Indo-China, the largest commercial center in Cochin-China.

**Cholula**, ancient Aztec town. Puebla, Mexico. There are several ruins, the most interesting being the truncated pyramid, 177 ft. high, and crowned by a church of Spanish-American design, occupying the site of the oldest and highest *teocalli* ('God's house') in Mexico.

**Chondrodite** is red or brown mineral sometimes developed in crystalline limestones at igneous contacts, and having much the appearance of garnet.

**Chonos Archipelago**, group of a thousand islands, rocks, and reefs, mainly uninhabited, off the w. coast of Chile, separated from the mainland by the Moraleda Channel.

**Chontals** (*Lencas*), formerly a widespread people of Central America, still numerous in the northeastern parts of Nicaragua and the neighboring districts of Honduras. Although despised by the Aztecs, who called them Popoloca ('aliens,' 'barbarians'), the Chontals were a more or less civilized people, as is shown by the ruins and objects found in and about the graves in districts known to have been occupied by them.

**Chopin, François Frédéric** (1809-49), Polish musical composer and pianist, born near Warsaw. He first appeared in public when nine years of age, and at nineteen started on a concert tour, later (1831) settling in Paris, where he enjoyed till his death the intimate friendship of the *élite* of that city, among others George Sand (Mme. Dudevant). As a pianist, with the exception of Liszt, Chopin was without a peer, though he seldom performed at public concerts. In his method of fingering he was among the first—if not the first—to use the thumb freely on black keys, an innovation which had an important influence on modern piano technique. As a composer for his instrument Chopin stands alone, the peculiar bias of his genius causing him to produce works incomparable with those of any other composer. Though tinged with characteristics amounting to mannerisms, his compositions are replete with a wealth of poetic imagery and beauty which renders them indescribably fascinating. He used dance forms and rhythms largely, notably that of the mazurka. Of Chopin's works the best edition is that of Karl Klind-

worth, published at Moscow. See Liszt's *F. Chopin* (4th ed. 1890); Huneker's *Chopin, the Man and his Music* (1900); and *Frederic Chopin as a Man and Musician*, by Niecks (1888).

**Chorale**, a name given to words and music of a species of composition introduced by Luther into the services of the German Reformed Church and sung by the entire congregation in unison. The words were in the form of hymns, often written in the vernacular. The music, when not original, was frequently adapted from hymn tunes of the Roman Catholic Church, while secular melodies were often used. The first important collection of chorales was published at Wittenberg in 1524.

**Chord**, in music, the harmonious union of notes of different pitch sounded simultaneously. See HARMONY.

**Chord**, in geometry, a line joining the extremities of an arc. A scale of chords (geometrical drawing) is sometimes used instead of a protractor to plot out angles.

**Chordata**, a term sometimes preferred to the more restricted Vertebrata as a general name for the forms of life currently known as backboneed animals. The term refers to the presence, at some period of life, of a dorsal supporting rod, the notochord, or *chorda dorsalis*. See VERTEBRATES.

**Chorea**, or **St. Vitus's Dance**. Common chorea, or chorea minor, is a nervous disorder, in which there are constant uncontrollable jerking movements of the face, head, body, or limbs, and sometimes of all these. In slight cases the movement may be temporarily controlled by an effort of will, and it usually, though not always, ceases during sleep. Common chorea is generally a disease of childhood, most frequent between the ages of eight and fifteen, and about thrice as common in girls as in boys. It is especially associated with rheumatism and endocarditis, often following, or being immediately followed by, acute rheumatism, and being almost always accompanied by the heart-sounds of endocarditis (inflammation of the lining membrane of the heart). The rheumatic tendency is no doubt the predisposing cause, and given that, the exciting causes are various. Malnutrition, exhaustion, and fright have each been found to be the cause in many instances. Chorea in adults always tends to be more severe than in children. See Holt's *Diseases of Infancy and Childhood* (1904).

**Choregus** (lit. 'leader or master of the

chorus'), a person who at Athens supplied the expenses of the chorus in the dramas and other musical contests. If his chorus were victorious, he received as prize a tripod, which he consecrated, and usually built a monument on which it was placed. One such monument, that of Lysicrates, still stands at Athens, but there was a whole street of them. See Haigh's *Attic Theatre* (1889).

**Choreography**, the art of dancing notation which is a system of signs used to indicate movements in dancing, just as in music the sounds are represented by notes. This art was developed by Beauchamps, the dancing-master of Louis XIV.

**Choriambus**, a metrical foot of four syllables, consisting of a trochee (or choreus) followed by an iambus.

**Chorley, Henry Fothergill** (1808-72), English musical critic. In 1883 Dilke engaged him on the *Athenæum*, where he soon became chief musical editor, holding the post till he retired in 1866. His best works undoubtedly are his *Music and Manners in France and Germany* (1841), *Modern German Music* (1854), and *Thirty Years' Musical Recollections* (1862). A narrow but honest conception of music made him a strong opponent of such innovators as Wagner and Berlioz.

**Choroid**. See EYE.

**Chorotegans**, one of the pre-historic cultured peoples of Central America. At present nearly all are absorbed in the Hispano-American populations of Nicaragua and Honduras, of which they form one of the chief constituent elements. Under Aztec and Maya influences the Chorotegans had acquired a considerable degree of culture. But by the early Spanish missionaries their temples were levelled with the ground, their idols overthrown, and their graves desecrated. The colossal basalt monoliths in the islands of Lake Nicaragua have been attributed to the Chorotegans. They mostly affect the form of rudely-carved human figures.

**Chorus**, a name given to a body of singers; also applied to a form of composition for a number of voices. In ancient Greece the chorus was a band of singers and dancers who performed on occasions of ceremony and rejoicing, and who, during representations of comedy or tragedy, remained in front of the stage, singing or dancing to fill up pauses in the acting. A modern chorus divided into two choirs is termed *double*; composed of male and female voices, *mixed*. Choral compositions are varied in form. Simple, imitative, or contrapuntal harmony, recitatives for



CHRIST AT TWELVE YEARS OF AGE  
From a painting by Hofmann



solo or chorus, or solos with choral accompaniment may all be introduced, while some composers employ antiphonal writing. See **CHOIR**; **CHOREGUS**.

**Chose in Action**, in English law, the name given to personal property which is not actually in possession, but can only be reduced into possession by means of an action. Such things are debts, legacies, stocks, shares, patents, copyrights, and the like. All choses in action are assignable in writing, and, unless assigned by way of charge only, can be sued upon by the assignee in his own name, provided express notice in writing of the assignment has been given to the debtor, trustee, or other person liable. See **ASSIGNMENTS**.

**Choshi**, tn., Japan, has a temple placed high in the center of the city; p. 36,500.

**Chosroes I.**, or **Khosrau**, **The Great**, called **ANOSHIRVAN**, Persian king (531-579 A.D.) of the Sassanian dynasty. An enlightened sovereign, he fostered education and intellectual pursuits amongst his people, promoted agriculture, carried out extensive public works, regulated the taxes, and encouraged commerce.

**Chosroes II.** (590-628 A.D.), called **Parvez**, grandson of the former, married the daughter of the Byzantine emperor Maurice, who aided him against insurgents. To avenge Maurice's murder by Phocas he invaded (604) the Byzantine empire; seized the frontier fortress of Dara, Damascus, and Jerusalem (614), carrying away from this last 'the true Cross'; conquered Egypt; and carried his victorious arms as far as Chalcedon, over against Byzantium. At last Chosroes was deposed, and eventually killed, by his own nobles, who raised his son Kavadh to the throne.

**Chouans**, a name applied to the royalists of Brittany during their revolt against the first French republic. Scarcely to be distinguished at first from brigandage, the skill and devotion of Cadoudal raised it almost to a holy war; while the passionate loyalty of the Breton peasants enabled the leaders, seriously to menace the republic, especially in 1795. The Chouans were quelled, the leaders were killed or obliged to surrender after July 1795. See Daudet's *Emigrés et Chouans* (1895).

**Chou-chia-kou**, mrkt. tn., Ho-nan, China. Its position at the point on which numerous rivers (giving access to all the n. part of the province) converge makes it a very important trade depot, having access to the n. part of the province.

**Chough**, a European crow of a glossy

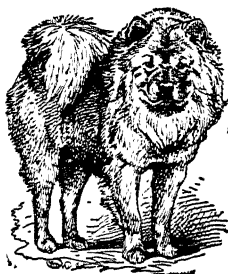
black color with the bill, legs, and feet a bright cherry-red. It is rather smaller than the rook and frequents rocky districts.



Chough.

**Chouquet**, Adolph Gustave (1819-86), French musical writer, went to the United States in 1840, where he lived for the following twenty years, returning to Paris in 1860. He wrote several light musical compositions, but is best known as a writer on the history of music, his principal book being *L'Histoire de la musique dramatique en France* (1873).

**Chow-chow**, a breed of dog imported from China where there are two types, the smooth and the rough. The smooth type has never been popular in England or the United States. The rough type, or common chow, is a medium size dog of 'whole' color, red, black, brown, cream or white, red being the most



Chow-Chow.

popular. The coat is thick and dense, the tail curly and always carried over the back, head square and massive, nose short, and tongue black.

The Chow is distinctly a 'one man' dog, exceedingly aloof to all but his master; he is playful and intelligent, a good watch-dog, courageous but not quarrelsome.

**Chrestomathy**, (Gr. 'good learning'), an annotated collection of choice extracts from an author or authors, especially one compiled

for instruction in a language, as a Hebrew *chrestomathy*.

**Chrétien** (or **Chrestian**) **de Troyes**, French poet of the 12th century. Chrétien's poems are the oldest metrical romances (as distinct from *lais*) dealing with the Arthurian tradition. Modern scholars are much divided as to his relation to his sources—whether dependent on existing tradition, and retelling tales already popular, or whether the adventures were from his own imagination, and allusions to similar incidents in contemporary and later writers are to be referred to him as the ultimate source. Chrétien's poems, by the excellence of their style, rank as French classics; he was the earliest writer in whom appear the special characteristics of French literature—lightness of touch, grace of expression, and literary style. Of his works we have *Eric et Enide*; *Cligès*; *Yvain*, or *Le Chevalier au Lion* (all critically edited by Foerster); *Perceval*, or *Li Conte del Graal*, left unfinished by Chrétien, and continued by four different writers, a poem of the highest importance for the Grail student.

**Chrism**, oil, sometimes mixed with balm, consecrated for use in certain sacraments of the Roman Catholic and Greek Churches. Children are anointed with it before baptism, and it is used in confirmation, in giving extreme unction to the dying, and also in anointing kings.

**Chrisome**, the robe worn by Roman Catholic infants at baptism to symbolize innocence. It represents the 'chrisome' cloth, which originally covered the head alone, and was placed there to prevent the chrisom oil from being rubbed off.

**Christ**, the Greek *Christos* (from *chrio*, 'I anoint'), which is used in the Septuagint and the New Testament as equivalent to the Hebrew *Mashiyach*, Messiah—i.e. Anointed. Anointing with oil (*mashach*) was among the Hebrews the symbol of consecration to high and sacred office and in course of time the title 'anointed' came to be applied even to some who, without any special consecrative act, were believed to be the bearers of a divine commission. The paramount interest of the name Christ lies in its application to Jesus of Nazareth. In process of time, the title, as applied to Him, became practically a proper name. See **CHRISTIAN**; **JESUS**; **MESSIAH**.

**Christ, Disciples of**, or **Church of Christ**, Disciples, an American Christian communion chiefly in the middle and western States. It is a union of two religious

movements which arose early in the 19th century. The first was a revival movement in Kentucky, 1801, led by the Rev. Barton W. Stone, a Presbyterian minister. It advocated a liberal tendency for its time. The second was a reform movement in Pennsylvania, 1809, led by the Rev. Thomas Campbell and his son, the Rev. Alexander Campbell of the Seceder Presbyterian Church of North Ireland. In 1832 the Campbell and Stone movements united. The principles of the Disciples are: Unity of the Church; sufficiency of the New Testament as the only rule of faith and practice; baptism of believers only by immersion; every Sunday celebration of the Lord's Supper, open to all Christians; the independence and autonomy of local church congregations; salvation by personal faith in Christ and obedience to His commands. The Disciples coöperate with numerous other religious bodies.

**Christadelphians**, a sect founded in the United States by Dr. John Thomas about 1850. They have no ordained ministers but meet for discussion. They reject the Trinity, believe in one supreme God, in Jesus Christ and in His second coming to establish His kingdom on earth, and in one baptism—immersion. In 1933 they had 78 churches with a membership of over 4,000.

**Christchurch**, municipal borough, England, in Southampton. It is noted for its beautiful Priory Church, the longest parish church in England; p. 9, 183.

**Christchurch**, city, New Zealand, capital of Canterbury provincial district. It is a modern, well built city. Features of interest are the Cathedral, a handsome building in Early English, the museum with a fine collection of natural history specimens, and the Supreme Court building. Summer and New Brighton, suburbs of the city are popular seaside resorts. Industries include foundries and manufactures of boots, shoes and agricultural implements. There is a large export trade in wool, timber and mutton; p. 126, 040.

**Christ Church College**. See **Oxford**.

**Christen, Ada** (1844-1901), pseudonym of **CHRISTIANE BREDEN**, an Austrian poet, born in Vienna. She is the author of *Lieder einer Verlorenen* (1873), *Schatten* (1873), *Unsere Nachbarn* (1884), and *Jungfer Mutter* (1892).

**Christening**. See **Baptism**.

**Christian**, the universally-used designation of the followers of Jesus Christ. Baur, arguing from the fact that *ianus* is a Latin, not



a Greek termination, believed that the name originated in Rome; but there is evidence to show that the form was adopted by Greek writers of a fairly early date. The word was sometimes written *Chrestianos*, from its resemblance to *chrestos* ('good'), and this form seems to have been favorably received by some Christian writers. The term was probably not of Christian origin, but of pagan, as a convenient name for a new sect.

**Christian**, the hero of Bunyan's *Pilgrim's Progress*, part i., who flees from the City of Destruction and journeys towards the Celestial City. His wife, **CHRISTIANA**, is the subject of the second part.

**Christian I.**, (1426-81), king of Denmark and Norway from 1448, and of Sweden from 1457 to 1471. He was also elected Duke of Schleswig-Holstein (1460), whence dates the connection of this duchy with Denmark. In 1478 he founded the University of Copenhagen.

**Christian II.** (1481-1559), king of Denmark, Norway (from 1513), and Sweden (1520). His cruel massacre of the nobility of Sweden ('Stockholm Blood-bath,' Nov. 8, 1520) induced the successful revolt of that kingdom; and his partiality for the lower classes in Denmark and for the Catholic religion led to his dethronement by the Danish nobility (1523), and to his imprisonment in the castle of Kallundborg till his death.

**Christian III.** (1503-59), king of Denmark (1534), and Norway. Under him the Lutheran reformation was completed.

**Christian IV.** (1577-1648), king of Denmark and Norway (1588-1648), founded the Danish navy and did much to promote commerce. Christian's enlightened attempt to emancipate the peasantry failed owing to the opposition of the nobles. In 1624 he founded Christiania, now Oslo, the present capital of Norway.

**Christian VIII.** (1786-1848), the last absolute king of Norway, and king of Denmark from 1830.

**Christian IX.** (1818-1906), king of Denmark, succeeded Frederick VII., Nov. 15, 1863. By the war of 1864 he lost Schleswig-Holstein to the allied Prussians and Austrians. In 1842 he married Princess Louise, daughter of the Landgrave William of Hesse-Kassel, by whom he had six children. His second son, George, became king of Greece (1863); one daughter, Alexandra, was the wife of King Edward VII. of England; another, Dagmar, married Czar Alexander III.; and a third the Duke of Cumberland. Christian was suc-

ceeded by his son, Frederick (1843-1912), who took the title of Frederick VIII., and was proclaimed king on Jan. 30, 1906, the day after his father's death.

**Christian X.** (1870- ), king of Denmark, was born in Charlottenlund. He succeeded to the throne on the death of his father, Frederick VIII. (1912).

**Christian, The Younger** (1599-1626), Duke of Brunswick and bishop of Halberstadt (1616), was born in Gröningen. He fought as a Protestant leader in the Thirty Years' War, devastating the Central Germany Roman Catholic electorates and bishoprics, until defeated by Tilly at Höchst (1622).

**Christian and Missionary Alliance**, a Protestant body formed as the Christian Alliance in 1887 and united with the International Missionary Alliance in 1897 under its present name, with headquarters in New York City. Its objects are the diffusion of the Gospel and the work of evangelization in the United States and foreign lands. Its work is interdenominational in character and is sustained by voluntary contributions.

**Christian Architecture.** See **Architecture**.

**Christian Brothers**, a religious congregation founded in Ireland in 1802 by Edmund Ignatius Rice for the education of poor boys. Papal sanction was received from Pius VII. in 1820. The members devote their lives gratuitously to instruction and take the vows of obedience, chastity, and poverty. The first house was established at Waterford; branch establishments are now found in many towns of Ireland and in the British Dominions, United States and elsewhere. The Christian Brothers are frequently confounded with a religious congregation of different origin but similar aim, known as the **BROTHERS OF THE CHRISTIAN SCHOOLS**, founded at Rheims by the Abbé de la Salle in 1684. For centuries most of the elementary education in France was given in their schools. They spread to other countries, and now have flourishing schools in many of the British possessions, the United States and other countries.

**Christian Church, The**, sometimes styled 'Christian Connection' or 'Newlights,' had its origin in 1792 in a protest against the alleged autocratic powers of the bishops in the Methodist Episcopal Church. At first the protesting party was known as 'Republican Methodists,' but in 1794 chose the name Christian. They take the Bible as their only creed, and in doctrinal teaching seek to use Biblical language as more satisfactory and less likely to

be the cause of divisions in the Church.

Growing out of an overture made by this Church to several denominations in 1924, a union was effected with the Congregational Church. Publications have been combined and missionary administration united. A single organization administers the joint interests and a joint moderatorship presides over the merged denominations. Consult Burnett's *Origin and Practice of the Christians*; Morrill's *History of the Christian Denomination in America* (1912).

**Christian Endeavor, Young People's Society of**, an interdenominational worldwide organization founded in Portland, Me., in 1881, by Francis E. Clark, a Congregational minister. Later the International Society of Christian Endeavor was formed, State and county and city unions organized, and a graded program established to parallel in an expressional and service program the age groups which are recognized in the Sunday Schools.

The objects of the Christian Endeavor society are to promote an earnest Christian life among its members, to increase their mutual acquaintance, and to make them more useful in the service of God. The movement is interdenominational and has been characterized by its insistence on church and denominational loyalty coupled with interdenominational cooperation and goodwill. There are about three million members in North America; four million in the entire world, including sixty countries on all the continents.

**Christian Era.** See **Chronology**.

**Christiania**, or **Kristiania**, for many years the name of the capital of Norway. It was changed in 1925, by vote of the Storting (National Assembly), to Oslo, the city's ancient name. See **OSLO**.

**Christianity.** See **Christian**; **Jesus Christ**; **Church**.

**Christian Missions.** See **Missions**.

**Christian Reformed Church.** See **Reformed Churches**.

**Christians**, popular name of two religious bodies. See **CHRIST, DISCIPLES OF**; **CHRISTIAN CHURCH, THE**.

**Christiansand**, town and seaport, Norway, in the southern part. Christiansand was founded in 1641. It suffered repeatedly from destructive fires and was practically rebuilt in 1892; p. 16,543.

**Christian Science**, a system of moral and religious instruction founded upon principles formulated by Mary Baker Eddy in her book *Science and Health with Key to the Scrip-*

*tures*, the textbook of Christian Science, first published in 1875. In 1879 Mrs. Eddy organized in Boston, Mass., The First Church of Christ, Scientist, and was ordained its pastor. This church is now known as The Mother Church and has a magnificent building erected in 1906 at a cost of nearly \$3,000,000. Christian Science affirms that God is the only cause and creator, that God is Person in the infinite sense but not in the humanly circumscribed sense; that the Holy Ghost is the 'Spirit of Truth,' and that Jesus Christ is the image of divine Mind, which is one with the Father. It teaches that sin, disease, and all the woes of mankind, though seemingly real, have no divine authority; that they are material, erring, mortal phenomena, and must be so recognized and overcome by spiritual understanding of divine reality. Christian Science recognizes no mind apart from God; in its practice the human will is stilled and the divine will governs. Christian Scientists believe in God, in Jesus Christ, and in the Holy Ghost, the divine Comforter. They believe in the Scriptures as the inspired word of God, in the crucifixion and resurrection of Jesus Christ, and in prayer unceasing.

In the Christian Science church, which now has branches throughout the civilized world, the lesson sermon takes the place of the usual clerical address. This lesson consists of compilations from the Bible, with correlative passages from the Christian Science textbook. No individual holds the title of pastor, but the services are conducted by two readers, one reading from the Bible, and the other from the textbook.

Consult Mrs. Eddy's writings, especially *Science and Health with Key to the Scriptures*, the textbook of Christian Science, and *Retrospection and Introspection*, her autobiography.

In June, 1935, the erection of a tremendous new Christian Science Publishing House was completed in Boston, Mass., at a cost of four and a half millions. This building contains the now famous Mapparium, with the world's largest globe. Since its installation it has been visited by thousands of persons from all over the country.

In 1944 there were 2879 Christian Science churches and societies, of which 2190 churches and societies were in the United States, with the others scattered in many parts of the world.

**Christians of St. Thomas.** See **Thomas**.

**Christian Temperance Union.** See **Woman's Christian Temperance Union**.



*By Burton Holmes, from Ewing Galloway, N. Y.*

*Christ of the Andes.*

**Christian Union Churches, or Independent Churches of Christ in Christian Union**, an organization formed in 1863-64 by seceders from five denominations on the basis of opposition to war and to the introduction of politics into the pulpit. The union is non-partisan, unsectarian, and undenominational.

**Christie's**, famous art auction-room, in London, England, established about the middle of the 18th century by James Christie (1730-1803), and afterward carried on by his son James (1773-1831), well known as an antiquary. The present name of the firm is Christie, Manson, and Wood. The best

known dealers in art collections in the world, the firm has conducted many sensational sales. Among these was the sale of the Hamilton Palace collection (1882), lasting seventeen days and realizing a total of £397,562.

**Christina**, (1626-89), queen of Sweden from 1632 to 1654, was the only daughter of Gustavus Adolphus whom she succeeded on the throne. Christina had received an excellent education and had gathered about her men of learning and culture, but financial distress, political embarrassments, impatience of control, and a desire for complete independence led in 1654 to her voluntary abdication in favor of her cousin, Prince Charles. She spent some time in France, where she engaged in literary pursuits, but in 1657, having incurred the indignation of the French court by the murder of her trusted servant Monaldesco, she left France for Rome. On the death of Charles, in 1660, she returned to Sweden, and after an unsuccessful attempt to recover the throne went again to Rome, where she spent the remainder of her life.

**Christine de Pisan**, (1363-1431), French author, said to have been the first woman in France who made a livelihood by literature. She wrote much, and in every genre. Her works in prose form one of the chief sources for the social history of the period, especially *Le livre des faits et bonnes mœurs du roi Charles V.* and *Le livre de paix*.

**Christmas**, originally *Cristes masse* ('the mass or church festival of Christ'), the English name for the season in which the birth of Christ is commemorated. It is apparent, however, that a festival was celebrated at this season long before it was held sacred as the birthday of Jesus of Nazareth. The Saturnalia of the Romans and the winter festival of the heathen Britons were both celebrated about Dec. 25; and later, the Roman festival in honor of the sun-god, Mithra (instituted 273 A.D.). A study of the customs associated with this period also reveals a pagan origin. The lighting of the Yule log (*la bûche de Noël*) on Christmas Eve, once a widespread European custom, is or was a function of such predominant importance among the Lithuanians and Letts that their words for Christmas Eve literally signify 'Log Evening.' The sports of the 'Lords of Misrule' in England are thought to be an inheritance from the Saturnalia. The decoration of churches with the once sacred mistletoe and holly is also a pagan survival, while the sending of gifts may be traced back to

the Yule gifts of Northern Europe and ancient Rome.

The *Christmas tree*, a young spruce or similar tree with its branches gayly illuminated with colored candles, and hung with ornaments and with gifts, is of German origin. Father Christmas, or Santa Claus, who is supposed to come from the far north in his reindeer sledge, laden with toys, on Christmas Eve, is identified with St. Nicholas or Nicolas, and also with Knecht Ruprecht and Robin Goodfellow. Grimm notes that in some parts of Germany Knecht Nicolas is merely the attendant on the real gift-giver, who is sometimes the infant Christ and sometimes Dame Bertha, though he is frequently represented as an ugly hunch-backed dwarf, called Krampus, who carries off naughty children.

*Christmas Music* occupies a large part in the season's celebration. Carol singing by the 'waits,' strolling street musicians, is an old British custom that has recently been revived in many towns and cities. The *Christmas card* is of modern origin, the first one dating from about 1846. In the Roman Catholic, the Anglican, and the Lutheran churches, Christmas is observed as one of the great festivals of the Christian year. Other Protestant bodies are more and more tending towards a religious observance of the day. Consult Miles' *Christmas in Ritual and Tradition* (1912); Crippen's *Christmas and Christmas Lore* (1923).

**Christmas Island**, largest atoll in the Pacific Ocean, discovered in 1777 by Cook, and annexed by Great Britain in 1888. It has been leased for a period of eighty-seven years, beginning Jan. 1, 1914, to the Central Pacific Cocomat Plantations; p. less than 100.

**Christmas Island**, an isolated island in the Indian Ocean. It is a typical atoll formed upon the summit of a submarine volcano. The vegetation is tropical and dense, and both flora and fauna include numerous indigenous species. In 1888 it was annexed by Great Britain, and now forms a dependency of the Straits Settlements. Consult Andrews' *Christmas Island*.

**Christmas Rose**. See *Hellebore*.

**Christ of the Andes**, a bronze figure of Christ erected on the summit of La Cumbre, over 12,000 ft. above sea level, on the boundary line between Chile and Argentina, to commemorate the treaty of peace and arbitration made between the two countries in 1903. It is the work of an Argentine sculptor. Mateo Alonzo.

**Christophe, Henri** (1767-1820), negro king of Haiti, was born in the West Indian island of Grenada, and during his early years was a slave there. When the negroes of Haiti, under Toussaint l'Ouverture, rose against their French masters (1790), he went to the scene of action and soon became one of the leaders of the movement. He at first swore allegiance to Dessalines, the negro leader, who had usurped the title 'Emperor of Haiti.' Having killed him, Christophe assumed his position, being first proclaimed president for life of the republic of Haiti (1806), and then king (1812). After a stormy reign, he found the republican negroes arrayed against him (1820), and, to avoid imprisonment, shot himself. See **BLACK MAJESTY** (1928) by Vandercook.

**Christopher, Saint**, legendary martyr of the 3rd century, was reputed to be a native of Palestine or Syria, and a giant in stature and strength. In his quest for one stronger than himself, he entered the service of the devil, but left him on hearing of Christ's greater strength. As a work of charity he stationed himself beside a river and carried travellers across on his shoulders. One night he started with a child, who steadily increased in weight until in midstream the giant's strength gave out, he was forced beneath the waves and thus baptized, and the child was revealed as the Christ. Christopher suffered himself to be beheaded, that his blood might heal his enemy. He was one of the most popular saints in all Europe and the East, and was a frequent subject of Christian art. His festival is celebrated July 25 in the Roman Catholic and May 9 in the Greek Church.

**Christopulos, Athanasios** (1772-1847), Greek poet and philologist, was born in Kastoria (Macedonia). He wrote a grammar of the modern Greek language (1804), and other works on modern Greek philology (1853), but is specially remembered for his poems in the anacreontic style.

**Christ's College.** See **Cambridge**.

**Christ's Hospital**, an educational institution in London, England, more familiarly known as the Blue-Coat School. It was founded in 1552 by Edward VI. on the site of the Gray Friars Monastery in Newgate Street, as a refuge for orphans and foundlings, and moved to Horsham in 1902. The buildings at Horsham accommodate about 820 boys and there is a girls' boarding school affiliated at Hertford. The school, which is one of the best of its kind in England, is

conducted along the usual lines of an English public school. The boys still retain the original costume, almost coeval with the school itself, consisting of long blue gowns, red girdles, yellow stockings, and knee-breeches. No head-covering is worn, even in winter. Among distinguished pupils of the school are Coleridge, Lamb, and Leigh Hunt.

**Christ's Thorn**, the name given to various plants supposed to have furnished Christ's crown of thorns. The most commonly named is a prickly shrub about 7 ft. high, the garland thorn native to the s. of Europe and to the w. of Asia, and growing abundantly in Palestine.

**Christy, Howard Chandler** (1873- ), American illustrator and writer, began work as an illustrator in 1895, at once gaining a high reputation for his illustrations of fiction characterized by spirit and grace. During the Spanish War (1898) he accompanied the army to Cuba on behalf of Scribner's Magazine and Leslie's Weekly, and contributed letters and sketches to those periodicals. Since 1920 he has devoted himself to portraiture and has painted portraits of many of the world's most famous men and women.

**Chromatic**, (derived from the name of one of the Greek tetrachords), in music, the term applies to notes, in melody or harmony, marked with accidentals which do not cause modulation. A scale proceeding by semitones only is called a chromatic scale. See **INTERVAL**.

**Chrome Yellow**, the chromate of lead (PbCrO<sub>4</sub>), pigments varying in color from light yellow to vermilion, prepared by precipitating lead acetate with a soluble chromate or bichromate or by electrolysis, using a lead anode and an electrolyte containing soluble acetate and chromate. The chrome yellows are used in dyeing and as pigments; they cover well, but are liable to darken in time through the action of the hydrogen sulphide present in traces in the air.

**Chromic Acid** (H<sub>2</sub>CrO<sub>4</sub>) has been obtained in small red crystals by freezing a solution of chromic anhydride in water, but is chiefly important as the source of a series of salts called chromates. The ordinary 'chromic acid' of commerce is the anhydrous oxide, Cr<sub>2</sub>O<sub>3</sub>, and not the true acid. The chromates are of three classes—normal chromates, bichromates, and basic chromates.

The basic chromates, or compounds of the normal chromate with excess of the base, are represented by the chrome oranges and reds. See **CHROME YELLOW**. The insoluble chro-

mates of lead, barium, and zinc are useful as pigments; while the soluble ones, notably of potassium and sodium, are used in dyeing and calico-printing, and for the preparation of the others. A special use of potassium bichromate is due to its power of making gelatine that is impregnated it with insoluble when exposed to the light—a property that is much employed in photography and photo-mechanical printing processes.

**Chromite, or Chrome Iron Ore,** the only ore worked for the metal, is an oxide of iron and chromium, containing, when pure, 68 per cent. of chromic oxide; commercially it usually carries 35 to 55 per cent.; it is

1928 was about 1,350,000 tons, a substantial increase over any previous year.

**Chromium** (Cr. 52.01), a metallic element closely related to iron and manganese. Its only commercial source is the mineral chromite, a chrome iron ore, which when pure carries 68.0 per cent of Cr; ordinary commercial ores carry 35 to 55 per cent. The chief uses of chromium are in low-chromium steels, high-chromium steels, high-chromium ferrous alloys, non-ferrous alloys, and in chromium plating. In low-chromium steels, the chromium is used to impart increased hardness and toughness to structural and machine steels. The high-chromium steels include the so-



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*Speech Hall, Christ's Hospital School, Horsham.*

iron-black or sometimes brownish-black in color, with a brown streak. It is a member of the spinel group of minerals, and often contains magnesia, alumina, and other impurities. It is of commercial importance as a source of the metal, of chromates and bichromates; and is also extensively used in the metallurgical industry as a refractory in high-temperature furnaces.

Production has been rapidly increasing during recent years, due to increased demand for metallic chromium as well as for other uses. The world's production of chromite in

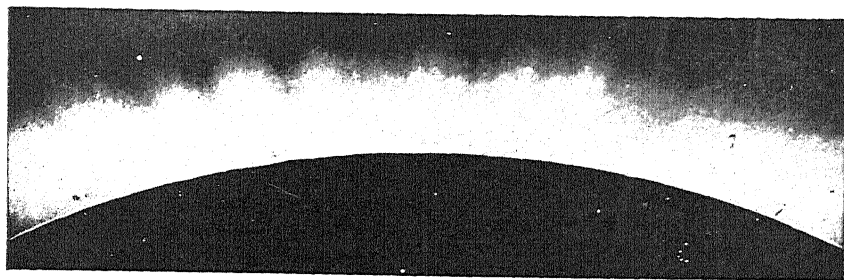
called stainless steels and irons, the chromium being added to increase the resistance of the metal to atmospheric or chemical corrosion. There is a growing use of alloys of chromium with non-ferrous metals, particularly with high percentages of nickel and cobalt, for resistance to atmospheric corrosion at high temperatures, and for extreme hardness, for use as tools, or to resist abrasion; for the latter use, tungsten also enters into the composition. Another important use of chromium of recent origin is in the plating industry, to replace nickel.

Until World War II the U. S. imported most of its chromium. A miracle achievement of that year was the opening of the huge deposit in the Beartooth Mts., Montana.

**Chromosome.** See **Embryology; Eugenics.**

**Chromosphere,** may be described as an ocean of gaseous fires completely surrounding the sun and averaging 6,000 miles in depth; during total eclipses it shows as a scarlet serrated border to the black lunar disc, and although visually effaced by daylight it comes at all times within the scope of spectroscopic observation. This envelope of flaming gases, composed mainly of hydrogen, helium, and calcium vapor, is separated from the sun by a comparatively quiet-

In the time, and doubtless under the inspiration, of Alfred the Great the annals not merely became 'a full record of events,' but attained to the dignity of history, and as such furnish the earliest historical prose in any European vernacular. Then a systematic chronicle was compiled, beginning about the birth of Christ, from what materials were available. This earliest chronicle was certainly copied, and the copies developed different characteristics in accordance with varying circumstances. Local entries were made, and even inserted among the earlier annals; Northern and Mercian records and fuller material from Bede were embodied in some copies; and thus each carefully-kept chronicle tended to acquire an identity and individual-



*The Sun's Chromosphere.*

During the Total Solar Eclipse of May 28, 1900.

cent layer. From the chromosphere rise to prodigious heights the filmy structures known as 'prominences.' They are divided into two classes—the 'quiescent' and the 'eruptive.' The former frequent high solar latitudes, and resemble cloud-banks or colossal forests. The latter are flamelike and evanescent. They spring up with extraordinary velocities to vast heights, then rapidly dissolve and disappear. Prominences of both kinds are usually rosy or crimson; but white specimens of imposing size are sometimes visible during eclipses, and, since their light is continuous, they are inaccessible to daylight observation. The daylight photography of the chromosphere and its appendages was successfully initiated in 1891 by Professor Hale in the U. S. and M. Deslandres in France.

**Chronicle, Anglo-Saxon.** The *Anglo-Saxon*, or, as it is usually called, the *Saxon Chronicle*, would be more correctly termed 'Chronicles.' It is a set of manuscripts containing historical records over a period of years and written by various persons. The basic chronicle extends to the year 962.

ity of its own. A characteristic of the earlier years is the insertion of curious genealogies, of the later years, the insertion of poems, of which the first and best is the famous Battle of Brunanburh in 937. The introduction to his second volume contains such a full and masterly treatment of the subject as to render all other books unnecessary. Thorpe's edition in the 'Rolls Series' contains the six mss. in parallel columns, for a translation.

**Chronicles, The First and Second Books of,** really constitute a single work, intended to furnish a continuous account of the history of the chosen people from Adam till the return from captivity. It may be divided as follows: (1.) Mainly genealogies. In spite of the suggestion implied in its Greek name, it is an independent and complete work, showing a clear-marked style and a definite literary plan. The documents quoted by the author are many. (2.) The doings of the kings of Israel; but these are all referred to as repositories of further information rather than as authorities. The omissions of Chronicles, notably in respect of the more repreh-

sible features of the reigns of David and Solomon, are remarkable, and have led some critics to suppose that the author was a falsifier. The chronicler had also a fondness for large numbers, and his main interest was ecclesiastical; for the rest, he seems to be a man of sincere and simple piety; and if he manifests a high appreciation of the external forms of worship, he is also possessed by an intense belief in God, and the motives of his whole work are manifestly of the purest. See W. H. Bennett, in *Expositor's Bible* (1894); and for the text *Chronicles* in the *Polychrome Bible* (1895).

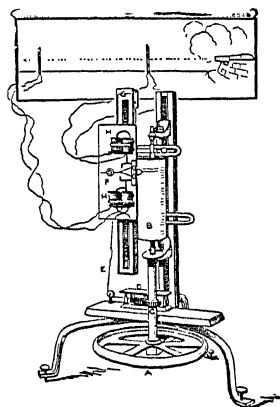
**Chronogram** (Gr. 'time-writing'), a device by which certain letters in an inscription are made to stand out with special prominence, such letters indicating in Roman numerals a certain date which has to be commemorated. Thus we see on a medal of Gustavus Adolphus the following words: CHRISTUS DVX, ERGO TRIVMPHVS. If you take the pains to pick the figures out of the several words, you will find they amount to MDC·XVXVII, or 1627, the year in which the medal was stamped.

**Chronograph**, an instrument for registering mechanically intervals of time in such a manner that inspection of the record afterward enables the observer to measure these intervals with great accuracy. Its essential parts are generally a cylinder kept by clockwork in continuous revolution, and a marker which travels parallel to the axis of the cylinder and registers a fine spiral line on a sheet of paper wrapped round the cylinder.

It was by means of an instrument constructed on these principles as far back as 1864 that Bashforth carried out his great experiments on the flight of projectiles shot through the air with high velocities. In this case two markers were necessary—the one to note the successive seconds, and the other to note the instant at which the projectile passed a given point, or the successive instants at which it passed a series of points. The chronograph differs from the chronometer and chronoscope in being self-registering; all are instruments for measuring time.

**Chronology** treats of arrangements and divisions of time whereby historical events may be placed in the order of their succession. Among primitive peoples the duration of a lunar month was sufficient for their few records; but with more advanced civilization a less variable division of time and a fixed starting-point or era became indispen-

sable. The most convenient era is the one that precedes all historical events, and is termed 'the beginning of the world'—an arbitrary point, but giving an uninterrupted sequence. Other eras have the disadvantage that the dates of some events must be reckoned forward from the era, and of others



*The Bashforth Chronograph.*

A, Flywheel turning cylinder on which the record is marked; c, toothed wheel driving drum D, which unwinds the spring E and allows the platform F to slide down the groove G; H, H, electro-magnets connected with the first and second screen respectively (shown in the small upper diagram).

backward. Thus, in using the Dionysian era of the birth of Christ, years preceding the era must be distinguished by the letters B.C., and those following by A.D. Furthermore, as the year immediately preceding A.D. 1 is B.C. 1, the interval between two events, of which one occurred before the era and the other after, cannot be ascertained by simply adding together the number of the years; for if the date of the one is 14 B.C., it occurred less than fourteen years before the birth of Christ. To obviate this difficulty, astronomers denote the year of Christ's birth by 0, so that B.C. 14 becomes B.C. 13. The Julian period, invented by Joseph Scaliger in 1582, is frequently used, as affording a convenient means of comparing eras. It consists of 7980 Julian years, and the year 4714 corresponds to A.D. 1. The Christians of Antioch adopted the era of Alexandria, computed by Julius Africanus.



who reckoned 5500 years from the creation of Adam to the birth of Christ, which latter event he placed three years before the Dionysian era. In the Greek Church the era of Constantinople is used, and it was followed by the Russians till the time of Peter the Great. Its date is Sept. 1, 5508 B.C. The Jews also employ a mundane era, the beginning of the world being reckoned as Oct. 1, 3761 B.C. From the Old Testament narratives many calculations have been made of the date of the creation, the most generally accepted date being 4004 B.C. The chief eras and their dates in the Gregorian calendar are given in the following table:

Era	Commencement
Julian period . . . . .	4713 B.C.
Era of Constantinople . . .	Sept. 1, 5508 B.C.
Era of Alexandria . . . . .	Aug. 29, 5502 B.C.
Era of Antioch . . . . .	Aug. 29, 5492 B.C.
The mundane era . . . . .	4008 B.C.
Jewish mundane era . . . . .	Oct. 1, 3761 B.C.
Era of Nabonassar . . . . .	Feb. 26, 747 B.C.
First Olympiad . . . . .	July 1, 776 B.C.
Era of Alexander . . . . .	Sept. 1, 323 B.C.
Macedonian era . . . . .	Sept. 1, 312 B.C.
Era of Tyre . . . . .	Oct. 19, 125 B.C.
Cæsarean era of Antioch (battle of Pharsalia) . . .	Aug. 9, 48 B.C.
Julian era . . . . .	Jan. 1, 45 B.C.
Era of Spain . . . . .	Jan. 1, 38 B.C.
Era of Diocletian . . . . .	Sept. 1, 284 A.D.
Armenian era . . . . .	July 9, 552 A.D.
Mohammedan era . . . . .	July 16, 622 A.D.
Persian or Gelat-ed-din era	June 16, 632 A.D.

The natural month was at first used to determine dates, as by the Jews in the earlier centuries of their history. After the dispersion, however, they were obliged to regulate their calendar by a cycle, in order that their festivals might be held on the same days all over the world. For this purpose they invented a cycle of 84 years. This cycle was borrowed by many of the early Christians, among others by the followers of St. Columba, and hence disputes arose as to the date of Easter when the Roman Church found its way into Britain. Soon after the Nicene Council the Jews changed their cycle for that of Meton. The ordinary year consists of twelve months—*viz.* Tisri, 30 days; Marchesvan, Chesvan, or Bul, 29 or 30; Chislew, 29 or 30; Tebeth, 29; Sheba, 30; Adar, 29; Nissan or Abib, 30; Iyar or Ziv, 29; Sivan,

30; Tammuz, 29; Ab, 30; and Elul, 29. In order to render the reckoning approximate to the solar, a month, Veadar, of 29 days, is inserted between Adar and Nisan in intercalary years, in which also the last month, Elul, has 30 days. Owing to the varying lengths of Marchesvan and Chislew, the ordinary years may consist of 353 to 355 days, and the intercalary of 383 to 385. As a rule, the first year of the cycle begins with the first of Tisri, about October 2; while the other years begin earlier, gradually retrograding through the seasons. The year is formed from the Gregorian year by adding 3671, and the year of the cycle by dividing by 19. When the remainder is 3, 6, 8, 11, 14, 17, or 19, the year is embolismic or intercalary.

The Greek year was originally lunar, consisting of 12 months of 30 and 29 days alternately; but the discordance between the civil year and the solar soon became apparent, and to correct it an intercalary month, Poseideon, was inserted three times in 8 years. But the 99 lunations in these 8 years amounted to about  $1\frac{1}{2}$  days too little, and in order to adjust the year more closely to the lunar revolutions, Meton, in 432 B.C., proposed the use of a 19 year cycle which should contain 235 months. These months were of 30 days each, and were made up by inserting a second Poseideon seven times—*viz.* in the third, fifth, eighth, eleventh, thirteenth, sixteenth, nineteenth years; but as they would contain 7050 days, whereas, according to Meton's calculation, the whole cycle should contain 6940 days, he cut every sixty-third day throughout the period.

The Roman year ascribed to Romulus consisted of only 10 months. To these Numa is said to have added January and February, and to have ordained that the year should consist of 12 lunar months and 1 day over, amounting to 355 days in all. In Cæsar's time the differences of the civil and solar years sometimes amounted to several months, as the pontifices, whose duty it was to regulate the calendar, performed it in a careless and arbitrary manner. In order to restore the year to its proper position with regard to the seasons, the year 708 A.U.C. (46 B.C.), the year of 'confusion,' was extended to 445 days, and the new reckoning was commenced on January 1, 45 B.C. The ordinary year, as now, consisted of 365 days, and every fourth year a day was inserted after February 24. The months were divided by calends, the first day of the month; the nones on the fifth; and the ides on the thirteenth; and in March,

May, July, and October the nones fell on the seventh, and the ides on the fifteenth. The days were also reckoned backwards, February 24 being the sixth day before the calends of March (*ante diem sextum calendas Martii*). In intercalary years a day was inserted before February 24, and was called *bissexthus*, and hence the year was named *bissextilis*.

See GREGORY; also Nicolas's *The Chronology of History* (1830); Ideler's *Handbuch der math. und tech. Chronologie* (1831); *Companion to the British Almanac* (1830 and 1839).

**Chronometer**, an instrument in the nature of a clock or watch, for the very accurate measurement of time. Chronometers are set to the time of some first meridian. American and British ships use the time of the Greenwich meridian. The French use that of Paris. Chronometers are fitted in their cases on gimbals, by which means a horizontal position is always maintained. See also HOROLOGY.

**Chrysalis**, a term applied to the pupæ of many Lepidoptera. When a cocoon is present, the chrysalis lies within it; but typical chrysalids do not form cocoons.



Typical forms of Chrysalis.

a. *Argynnis*; b. *Vanessa*; c. *Sphinx*.

**Chrysander, Friedrich** (1826-1901), German musical writer, born at Lüththeen (Mecklenburg). Chrysander is one of the best musical historians of Germany, and was connected with, and himself edited, several of the leading musical magazines. Among his works are *Molltonari im Volksgesang und über das Oratorium* (1853), and the unfinished *Biographie Handels* (3 vols. 1858-67), a standard work, and a model of its kind.

**Chrysanthemum**, a genus of composite shrubs and herbs, including a large number of species. The common marguerite or Paris daisy (*C. frutescens*), a half-hardy plant usually grown in pots, may also be transferred to the open garden in May. The annual species rejoice in deep-dug soil and plenty of manure. The two most noteworthy are the crown daisy (*C. coronarium*) and the tricolor daisy (*C. carinatum*). The autumn chrysanthemums of the florist are derived from two Oriental species, *C. indicum* and

*C. sinense*. Many of the varieties are well adapted for out-of-door culture; but it is chiefly as pot plants for the decoration of conservatories in late autumn and early winter that chrysanthemums are so highly valued. Florists have divided the varieties into several classes, according to the type of flower produced. The Japanese are generally acknowl-



Chrysanthemums.  
Pompon Variety.

edged to be the most beautiful of all the chrysanthemums. See D. B. Crane's *Chrysanthemums* (1905) and L. H. Bailey's *Cyclopedia of Am. Horticulture* (1904).

**Chrysanthemum, Order of**, a Japanese order, instituted by the Mikado on Dec. 27, 1876, and bestowed only on sovereigns or on officials of the highest rank.

**Chrysarobin**, a crystalline powder, obtained from the Brazilian *araroba*. It is an anti-parasitic in skin diseases, and is best used in the form of an ointment.

**Chryseis**, daughter of Chryses, priest of Apollo at Chrysa, carried off by Agamemnon when the Greeks were besieging Troy. A plague sent by Apollo upon the Greeks made them give up the maiden. See *Iliad*, bk. 1.

**Chryselephantine**, formed of gold and

ivory. The most famous works of Phidias, the Athene at Athens and the Zeus at Olympia, both of colossal size, were of these materials.

**Chrysippus** (280-207 B.C.), Stoic philosopher. Though not the founder of the Stoic system, he based its doctrines on systematic reasoning, and appears also to have popularized it upon its ethical side, making it a practical guide to life. He wrote upwards of 700 works, of which only fragments survive.

**Chrysoberyl**, a mineral consisting essentially of glucina and alumina, and valued for its great hardness, fine luster when polished, and often very beautiful color. It comes mostly from Ceylon, and many specimens show that chatoyancy which has given them the name of cymophane, or Oriental cat's-eye. But chrysoberyl also occurs without this property, and is then yellowish green, deep green, or brownish green in color. The variety alexandrite, which is obtained mostly from Siberia, is green in daylight, but purplish or red in artificial light, when properly cut.

**Chrysocola**, a green or bluish green silicate of copper,  $\text{CuSiO}_3 + 2\text{H}_2\text{O}$ , rather abundant in many mines. It may carry 22 per cent. of the metal, but is extremely variable. It is common in Arizona and Utah mines.

**Chrysolite**, a name for olivine, especially when used as a gem. French jewellers use the name *peridot*. About as hard as quartz, with imperfect cleavage, chrysolite is much improved in lustre by being polished but is too soft to be of great value as a gem-stone. Its color is usually a rather pale yellowish green.

**Chrysoloras, Manuel** (1350-1415), a Greek from Constantinople, who was the first to introduce the study of Greek into Italy. Besides numerous theological works, Chrysoloras wrote *Erotemata*, a Greek grammar in the form of question and answer.

**Chrysoprase**, a green variety of chalcedony, the color being probably due to the presence of oxide of nickel. It is somewhat brittle, but when carefully polished is a beautiful stone, and is employed for rings, brooches, and fine ornamental work. It comes principally from near Frankenstein (Silesia) in Germany, where it is found in veins in serpentine.

**Chrysostom, St. John** (A.D. 347-407), one of the fathers of the early church, was born at Antioch. For twelve years he preached at Antioch, and then removed to Constantinople, where for six years he eloquently denounced abuses among the clergy, as well as among the royal family and the people. The Em-

peror Arcadius exiled him to the desert borders of Armenia. His many pathetic letters roused such sympathy and indignation that Arcadius ordered his removal to Pityontes, on the Black Sea, necessitating a long journey on foot, during which he died at the chapel of Basiliscus, near Comana. His remains were brought to Constantinople in 438. His feast day is celebrated in the Eastern Church on Nov. 13, and in the Western on Jan. 27. His numerous works were published in Greek and Latin by Montfaucon (new ed. 1834-40), and in English in *Nicene and Post-Nicene Fathers* (1889-90).

**Chrysotile**, a fine silky fibrous variety of serpentine, which usually occurs in small veinlets within massive serpentine rock. This is the variety known in commerce and the arts as asbestos.

**Chuan-chou, Tsuan-chow-fu** or **Chin-chew** (the Zayton of Marco Polo), city and port in Fo-kien, China, famous of old as a great centre of commerce, and still a busy place of trade and a great fishing-centre.

**Chub**, the name of various fish belonging to the carp family.

**Chubut**, a territory of the Argentine Republic, flanked on the E. by the S. Atlantic, and on the W. by the Chilean cordillera. Rawson, its capital, is situated 3 m. N.W. of the mouth of the Chubut R. It was founded by Welsh settlers in 1865. The population is composed chiefly of Argentines, Italians, and Welsh, with a few native Indians, who are principally engaged in cattle-breeding. The greater part of the area. (93,400 sq. m.), is waterless, and partly covered with volcanic ash.

**Chu-fu Hsien**, or **Ki-foo Hien**, tn., Shantung, China; contains the tomb of Confucius.

**Chufut-Kaleh, Jidovskii Gorod**, or **Kyrker**, tn., Crimea. It is exclusively peopled by Karaite Jews, who regard it as their holy city. It abounds in antiquities, some reaching back to the 6th century, A.D.

**Chukches**, or **Tchuktches**, a nomadic race in the extreme N.E. of Asia, from 160° E. long., to Bering Str. Although incorporated in the Russian empire, they have never formally resigned their independence, nor do they pay taxes to Russia. They are peculiar in that they are a pastoral people living in an arctic environment. See Borgoras' *The Chukchee*, 1905.

**Chunam**, in the E. Indies, a name for a plaster made of quicklime and sand, the finer kinds of which take on a high polish; also

ivory. The most famous works of Phidias, the Athene at Athens and the Zeus at Olympia, both of colossal size, were of these materials.

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**Chunam**, in the E. Indies, a name for a plaster made of quicklime and sand, the finer kinds of which take on a high polish; also

the lime, made from shells or coral, chewed with the areca nut and betel leaf by the natives. In N. India the chunam is a weight equal to six grains troy, used in weighing gold.

**Churchos**, S. American Indians still numerous in the wooded districts of E. Peru, where they form several independent groups.

**Churchuses**, a warlike race of brigands infesting Manchuria and Mongolia. They claim complete independence, and refuse to acknowledge Chinese supremacy.

**Chundernagore**. See **Chandarnagar**.

**Chung-ching-fu**, or **Chung-king**, treaty port in Sze-chuen, China, on the l. bk. of the Yangtse-kiang; p. about 450,000.

**Ch'un, Prince**, regent of China; was the seventh son of the emperor Tao-kuang, brother of the emperor, Hsien-feng, and father of the emperor Kwang-hsu (1872-1908) and the emperor Hsuan-tung (born 1905, enthroned 1908). He was named regent and his son designated as emperor by the dowager empress (Tzu-hsi) and emperor (Kwang-hsu), presumably just before their mysterious deaths in Nov. 1908.

**Chupra**. See **Chapra**.

**Chuquisaca**, a dept. forming the s.e. corner of Bolivia, between the Paraguay R. and the Andes. Area, 26,410; p. about 392,738.

**Chur**. See **Coire**.

**Church**, a word which represents the Greek *eklesia*, a 'meeting, gathering, assembly.' In the New Testament it is used in this sense, and also with the special meaning of a 'congregation of Christians' or the 'entire body of Christians.' It is mainly with the latter signification that this article is concerned.

That Jesus purposed to found a society is doubtful. At any rate the indications of the New Testament are that he did not actually do so. He had a following after the manner of a teacher of the ancient world, which was fluctuating and quickly scattered. The first church history is the Book of Acts, supplemented by the Epistles. Hence we learn how the first Christian assemblies were conducted and constituted. As to the church order members were admitted by baptism, on making a profession of repentance and of faith in Jesus Christ. As the initiate was thereby considered to have died to the world, he must now live a life of consecration to the will and service of the Lord. For his Christian nurture and growth he required not only to keep in private communion with God through Christ, but also to take part in assemblies for worship and edification. These first gatherings

were 'house congregations,' but as various groups of Christians sprang up in a particular district or town, there arose in time the necessity for larger assemblies. Here we have the origin of the city church having its rendezvous either in the house of some prominent member or in a place specially set apart corresponding to the Jewish synagogue. These assemblies, whether house churches or city churches, seem to have met at first every day, but by-and-by the first day of the week (the day of the resurrection), was specially observed—probably from the analogy of the Jewish Sabbath—as a time for a more elaborate and solemn worship, and for the dispensing of the Lord's Supper, 'the breaking of bread.' In time the supper—at first a common meal, to which each brought his portion—became distinct from the ordinary assemblies for edification, the former being confined to the brethren, while the latter were of the nature of open meetings. The more public service being largely missionary in purpose, one of its main features was *teaching*, which included the reading of Scripture and hortatory and instructive discourses founded upon it. Naturally there was also *prayer* in which the congregation joined and *praise*, the most frequent form of which was the psalm or hymn sung by a member or by the whole assembly. The church, either as a larger or a smaller community, soon required a controlling and directing authority, and the form adopted bears close analogies to existing institutions—the synagogue and secular associations. Naturally at the head of the corporate body stood the *Apostles*—the name being applied not only to the twelve, but to such as had enjoyed personal contact with Christ; their authority was supreme, whether in regard to instruction or to government. Near them were the *prophets*, whose powers were equally extensive. But the apostolic functions tended in time to become divided. In course of time the organization became more elaborate; and for the spiritual unity there was substituted an external union dominated by a centralized government, which, germinating in the authority of the apostles and the supposed leadership of James in the Jerusalem church and of Peter among the apostles, developed into the provincial or metropolitan bishopric, and ultimately into the hierarchy of the Roman Catholic Church. See the general church histories mentioned below; for the apostolic age in particular, Neander's *Hist. of the Planting and Training of the Christian Church* (1842), Harnack's *History of Dogma* (1895), McGiffert's *Hist.*

of Christianity in the Apostolic Age (1891). For constitution and organization specially, Hodge's *Discussions on Church Polity* (1878; Presbyterian), Hatch's *Organization of the Early Christian Churches* (1882), Allen's *Christian Institutions* (1898).

In the necessarily brief outline which can be given here of a history which extends to nearly two millenniums, it will be convenient to make three divisions: The ancient church (A.D. 30-800); the mediæval period (800-1500); and the post-reformation or modern period. (For Jesus Christ, the foundation stone of the church, and for church history as a special department of theological study, see separate articles.)

The apostolic period begins with the day of Pentecost. Its characteristic features are the rapid growth of the church; the creation of the New Testament literature; an immense missionary activity, as seen in the work of the apostles and their associates; and the growing opposition of the Jews. Nor was the church long in coming into hostile contact with the imperial authorities; witness the persecution under Nero (in A.D. 64). The fall of Jerusalem in A.D. 70 marks the beginning of the post-apostolic period. During the 3d century missionaries carried Christianity to western Europe, and, in the East, to Armenia, Persia, and even India. The church began to be more favorably viewed by the emperors, but under Decius, in 250 A.D., there was a recrudescence of persecution, as again under Diocletian (284-305). The edict of Galerius (311) and the Edict of Milan (313)—the latter issued by Constantine—close at length the sanguinary story. The victory of Constantine over Licinius (323) made Christianity the most powerful religion in the empire. The development of the creed and the constitution had proceeded apace. Here occur the great names Irenæus, Hippolytus, Tertullian, Clement of Alexandria, Origen, and Cyprian, whose writings elaborate and fix the substance of the faith against Neo-Platonism, Sabellianism, and Chiliasm.

Under Constantine (323-337) and his sons Christianity became the religion of the empire, the pagan reaction under Julian (361-363) being powerless to stem the flowing tide of the church's power. But the 4th and 5th centuries were rife with theological controversies—the Arian heresy, repudiated at the Council of Nicæa, 325, and demolished at that of Constantinople, 381, being but one of many controversies. In the West, the long and bitter conflict between Augustine and

Pelagius was being fought. During this period arose the two great antagonistic schools of scriptural interpretation, the Neo-Alexandrian and the Antiochian, allegorical and literal respectively. The outward spread of the church in the East was much hampered by the rise and remarkable progress of Mohammedanism, and in the West the tendency to centralization became ever more powerful, so that when Charlemagne assumed, in 800, the crown of the Holy Roman Empire, it was as a vassal of the Bishop of Rome.

From 800-1500 was really a transition period, during which Christianity wrought itself out of Greek and Roman conditions into a variety of forms corresponding to the needs and characteristics of the modern nations. From one point of view the history of the church might be written as the history of the popes in their struggle to win and maintain absolute supremacy in spiritual and worldly affairs. But the Holy Roman Empire, the amalgamation of the universal church with the universal state, was never more than an aspiration. The Eastern (or Greek) Church had never been in sympathy with Roman claims, and, finally, the year 1054 saw the complete and incurable severance of the two communities. From the close of the 10th century there were instituted almost numberless monastic orders. The Franciscans or Minorites and the Dominicans or Preaching Orders arose about the beginning of the 13th century. The Crusades, designed to protect Christian pilgrims in the Holy Land, began about the end of the 11th century. From the monastic schools proceeded the remarkable intellectual movement known as scholasticism, 'The chivalry of theology,' the aim of which was to build up the orthodox dogmas into a complete logical system; while mysticism, a concurrent growth, sought to develop the doctrine of the spiritual life on line and principles that were often less logical than arbitrary and subjective. Heretical and schismatic movements arose, formulating a protest against what they termed the despotism and dogmatism of the church. Gregory IX. had already, in 1232, instituted the Inquisition. But the Reformation, though a distinctly religious and political movement, had deeper roots than the mere desire to overthrow hierarchy and dogmatism, and was really but a part, though an all-important one, of an extensive revolt of the human spirit against traditionalism in all its forms for which the revival of letters (renaissance, humanism), the invention of printing and the discovery of

America and the Cape route to India had prepared the mind of Europe.

It is thus impossible to give place and date for the inception of the Reformation. In England the foundations were already laid; and the early part of the 15th century saw the movement in full swing—in France, under Jacques Le Fèvre (Faber Stapulensis); in Switzerland, under Ulrich Zwingli; and in Germany, under Martin Luther. The work of John Calvin at Geneva carried the movement into French Switzerland; in Scotland the leading personality was John Knox. Speaking generally, the new order was embraced by the Teutonic peoples, while the Latin and Celtic nations held by the old. The Roman Catholic Church reformed abuses and proved its vitality in the movement known as the counter reformation, and reasserted its continuity with the ancient order in the decrees of the Council of Trent in 1545-63. Protestantism, however, showed two divergent tendencies almost from the first, opened the way not only for the development of the national churches, but also for the rise of a multiplicity of sects, each with its distinctive watchword. The fundamental antagonism of the two great sections of the church, as well as of the denominational rivalries so characteristic of Protestantism, has helped on perhaps the most remarkable feature of the period—a missionary energy comparable only to the apostolic work of the early community. In Roman Catholicism we have the self-denying labors of Loyola, Xavier, and their followers; in the Protestant churches, immense pioneer labors among the heathen during the 19th century. The 19th century was marked by a searching examination of traditional assumptions in the light of modern knowledge and by modern scientific methods, and a steadily increasing tendency to regard right character rather than right belief as the one thing needful. The standard church histories are Neander (trans. 6 vols., 1881); Gieseler (trans. 5 vols., 1857-80), and Philip Schaff (6 vols., 1882-92); briefer manuals are the church histories of Fisher (1887), and Newman (2 vols., 1900-1903); Alzog's *Manual of Universal Church History* (Eng. trans. by Pabisch and Byrne, 1878) and Krau's work of the same name are good Roman Catholic presentations. See CHURCH HISTORY.

**Church, Anglican.** The Church of England and all other churches which are in full communion with it. The liturgy used by all branches of the Anglican Church is not in every case the same, though the Book of

Common Prayer is adopted in a more or less modified form by all, and the Articles are universally accepted in the British dominions and by the Protestant Episcopal Church of the United States with changes made necessary by the separation of church and state and omitting mention of the Athanasian creed. In all cases the clergy are under Episcopal authority, and are believed to have been ordained by canonical bishops, the ministry of the Anglican Church being based upon the acceptance of the 'historic episcopate'—*i.e.* the theory that a bishop alone has the right to ordain both priests and deacons, and must himself be consecrated to his office by bishops who themselves have received consecration in continuous chain from the apostles of Christ. As to the rule of order no differences of opinion are held among churchmen; but as to the spiritual significance and importance of the rule there are wide variations of teaching. Although no formal declaration of intercommunion has ever been made between the Anglican and the Roman Catholic Church, the latter maintains an attitude of implacable hostility to the Anglican as heretical and lacking the proper succession, maintaining that when Queen Elizabeth reconstituted the Church of England the consecration of Matthew Parker as archbishop of Canterbury in the Nag's Head Inn, Cheapside, London, was uncanonical and therefore invalid. This claim is stoutly denied on the Anglican side and has occasioned a long and acrimonious discussion, sometimes called the Nag's Head controversy. An event of outstanding importance in the history of the Anglican Church occurred in 1927 when the Revision of the Prayer Book Measure was passed by the House of Lords only to be rejected by the House of Commons. The measure was the occasion for long and somewhat acrimonious debate, centering around the question of the reservation of the sacrament and other so-called 'high church' practices, and was defeated by a vote of 238 to 205. For list of cathedrals of the Anglican Church see article CATHEDRAL.

Protestantism was legally established in Ireland in 1551, but the established church never gained hold on the people. On Jan. 1, 1871, the church was disestablished by Mr. Gladstone. In 1877 the general synod revised the Book of Common Prayer on 'evangelical' lines. Being constantly face to face with an aggressive Roman Catholic Church, the Anglican Church in Ireland is inclined to the other extreme. (See IRELAND). In Scotland,

Episcopacy was practically abolished by the Book of Discipline in 1860, though titular bishops remained till 1880. After the Jacobite rising, in 1715, and especially after that of 1745, penal laws were enacted against the church, with the result that it was almost extinguished. These were relaxed in 1760, and removed in 1792. Since then the church has made rapid strides, especially in the towns. Its constitution as set out in the church of Scotland Act, 1921, exhibits the model of 'a free church in a free state,' such as Cavour projected in the nineteenth century. (See SCOTLAND.) The church is strong in Canada. Other dioceses include those of the provinces of India and Ceylon, New South Wales, Victoria, Queensland, Western Australia, New Zealand, China, Japan, South Africa, and the West Indies.

*The Church in the United States*—See PROTESTANT EPISCOPAL CHURCH.

*Bibliography*—Consult Shaw's *History of the English Church* (1920); Wakeman's *History of the Church of England* (1927).

**Church, Alfred John** (1829-1912), English classical scholar, was born in London. He was professor of Latin, University College, London (1860-8), and rector of Ashley, Gloucestershire (1892). His publications include popular versions of some of the classics.

**Church, Sir Arthur Herbert** (1834-1915), English chemist and writer, was born in London. He was well known as a lecturer, did original research in chemistry, and was made F.R.S. in 1888. Among his best known works are *Color*; *Precious Stones*; *Josiah Wedgwood*.

**Church, Benjamin** (1639-1718), American colonial soldier, famous as an Indian fighter in early New England, was born in Duxbury, Mass. He took a conspicuous part in King Philip's War (1675-6) and was the leader of the party which finally hunted down and killed King Philip (Aug. 12, 1676) at Mount Hope, R. I. In 1704 commanded the expedition, consisting of about 700 men, sent to Acadia to avenge the Indian atrocity at Deerfield, Mass. From Church's notes his son Thomas prepared the book, *Entertaining Passages relating to King Philip's War* (1716).

**Church, Frederic Edwin** (1826-1900), American landscape painter, was born in Hartford, Conn. He studied under Thomas Cole, at Catskill, N. Y. and early became successful as a landscape painter in New York City. He was elected to the National Academy in 1849. He visited South America in 1853

and 1857, and used the sketch material there obtained for some of his most important pictures. His best known work, *Great Fall of Niagara* (1857), painted from the Canadian side, is in the Corcoran gallery at Washington.

**Church, Frederick Stuart** (1842-1924), American painter and illustrator, was born in Grand Rapids, Mich. His poetically fanciful drawings in black and white first attracted attention. He followed these with oil paintings and water-colors in a similar vein, and was equally successful as an illustrator.

**Church, Sir Richard** (1784-1873), British soldier, the liberator of Greece, was the son of Matthew Church of Cork. When the Greek revolution broke out he was appointed generalissimo of the Greek army. His first action—an attempt to relieve the Acropolis—resulted in defeat; but next year (1828) he forced the garrisons of Missolonghi and Lepanto to surrender, and procured the evacuation of Acarnania by the Turks. In 1843 he took part in the revolution that overthrew King Otho, and in 1854 was made general in the Greek army.

**Church, Richard William** (1815-90), English divine, was born in Lisbon. He was appointed to the living of Whatley, Somersetshire (1852), and became dean of St. Paul's in 1871, but declined the English primacy. His judicious and monumental history of *The Oxford Movement* appeared in 1891 and a uniform edition of his purely literary writings in 1888.

**Church Ale**, a Whitsuntide feast in England by which money was obtained for repairing the church and for charitable purposes. The wardens brewed the ale, and the countryside joined in the various festivities. The practice gradually died out after the Reformation.

**Church Army**, an organization in connection with the Church of England, for the rescue of waifs and strays. It was founded in London in 1882, by the Rev. Wilson Carlike. An institution for the free training of working-men evangelists is a leading feature of the work and in 1888 a social system of labor homes was commenced.

**Church Congress**, an annual meeting of English Churchmen to discuss matters relating to the interests of their church. The first congress was held in Cambridge in 1861. The Protestant Episcopal Church in the United States also has a similar gathering of the same name, but its influence and importance are much less than in England.

**Church Discipline**, the procedure of the



Christian Church in dealing with the graver offences of its members. The principal means employed is the ban or excommunication—the depriving of the offender of his participation in the fellowship of the Church.

In the Middle Ages the prosecution and violent repression of heresy were particularly rife, and the early manifestations of doctrinal novelties were visited with extreme penalties. The reformers generally rejected the major or extreme excommunication, as being outside the authority of the Church, and repudiated all penances and indulgences, as immoral. In the Roman Catholic Church penance is a sacrament, and the greater excommunication is a recognized part of its discipline. In Protestant churches the minor excommunication alone is retained—at least in practice.

#### **Churches of God in Christ Jesus. See Second Adventists.**

**Church History**, a branch of theological study, the object of which is to describe the process by which the principles of Christianity have been wrought out in the history of the world from the time of Jesus Christ till the present day. It recounts the outward spread of the church, the interfusion by Christianity of the moral, social, and political life of nations, and the variation and development of ritual and of dogma. The most notable writers of the older period are Eusebius of Cæsarea, Socrates and Sozomen, Theodoret of Cyros in Syria, and Evagrius. The Middle Ages produced no great writer in church history, but abounded in biographies. The Reformation period produced the so-called *Magdeburg Centuries* (1574), a polemical work on the Protestant side written by many authorities, to which Cæsar Baronius replied from the Roman Catholic standpoint in his *Annales Ecclesiastici* (1588-1607). In recent times the greatest amount of good work in church history has been done by Germans including Adolph von Harnack. The United States has given us Schaff (of German descent), G. P. Fisher, and H. C. Sheldon; England, Milman, Smith and Cheetham, Robertson and Lightfoot; Holland, W. Moll; the Roman Catholic Church, Alzog, Höhler, Döllinger, Ritter and others. See CHURCH.

**Churchill, Mississippi, or English River**, a river of Canada, in Saskatchewan and Manitoba. Flowing east and northeast for a course of 900 miles it enters Hudson Bay at Fort Churchill. The river is impeded by rapids.

**Churchill, Charles** (1731-64), English poet, was born in Westminster. Ordained

priest in 1756, he succeeded his father in the curacy and lectureship of St. John's, Westminster, in 1758. In 1761, he published anonymously *The Rosciad*, a satire on the leading actors of the day, which had an immediate success. He avowed the authorship and replied to the critics in *The Apology* (1761).

**Churchill, Lord Randolph Henry Spencer** (1849-95), English statesman, the third son of the seventh Duke of Marlborough, was born at Blenheim Palace. The collapse of the Conservative party at the general election of 1880 acted as a spur to Lord Randolph, who soon distinguished himself as a powerful debater. He received the Indian secretaryship in the new Conservative administration (1885). After the return of the Conservatives to power, in 1886, he was appointed Chancellor of the Exchequer and leader of the House of Commons, but was in office only some five or six months, resigning on the ground that he differed from his colleagues on military and naval expenditure. He was a Tory in the Disraelian sense, both democratic and aggressive. In 1892 he published *Men, Mines, and Animals in South Africa*.

**Churchill, Winston** (1871- ), American author, was born in St. Louis, Mo. He worked for some time on the *Army and Navy Journal*, and for several months as managing editor of the *Cosmopolitan Magazine* (1895). His first novel, *The Celebrity*, was published in 1898. He then devoted himself to the writing of his group of American historical novels, the first of which, *Richard Carvel* (1899), quickly attained large circulation and received high praise. It was followed by *The Crisis* (1901), *The Crossing* (1904), *Coniston* (1906) and *Mr. Crewe's Career* (1908), each dealing with American life in the past century. Other books are *A Modern Chronicle* (1910); *The Dwelling Place of Light* (1917). Since 1898 he has made his home in New Hampshire.

**Churchill, Winston Leonard Spencer** (1874- ), English statesman and author, son of Lord Randolph Churchill and the former Jennie Jerome of New York, was educated at Harrow and Sandhurst and entered the army in 1895. He went to the Boer War as a correspondent for the London Morning Post and later took part in several battles. In his career, Churchill almost boxed the political compass, but always stood firmly against socialism. He was Home Secretary in 1904 and went to the Admiralty in 1911 where, with Lord Fisher, he made the navy ready for its great test of 1914-18. His ven-

turesome spirit was apparent when he landed a bluejacket force and naval guns on the Belgian coast soon after the outbreak of the war, intending to distract some of von Kluck's army from the assault on Belgium's fortified towns. He assumed much of the responsibility for the navy's adventure in the Dardanelles. After serving as a colonel of infantry at the front, Churchill returned to the Cabinet as Minister of Munitions, later becoming Secretary for War and Air Minister. In 1921 he became Secretary for the Colonies and in 1925 joined Baldwin's Government as Chancellor of the Exchequer, making the decision which returned England to the gold standard. He was recalled to head the Admiralty upon the outbreak of war in 1939, and became Prime Minister in May, 1940. Saying that he had nothing to offer the British but 'blood, toil, tears, and sweat,' his colorful personality and brilliant leadership inspired them to fight through World War II, at first against overwhelming odds. In 1942, in the face of severe criticism for the slow progress of the war, he won a vote of confidence, 464 to 1. He put labor leader Clement R. Attlee in as deputy Prime Minister. In May 1945 he resigned, preparatory to general elections, but was reappointed; however Attlee won 390 seats in Parliament and Churchill retired as Premier, but remaining in the House of Commons. His leadership, humor, and ability as an orator marked a public career of outstanding merit.

**Churching of Women**, ancient religious usage, founded on the Jewish law, and prevalent since the Middle Ages. In the Roman Catholic Church it is concerned solely with the thanksgiving of the mother for recovery from child-bearing; but in the Greek Church the Old Testament usage is combined with a later custom of presenting the child before the priest on the fortieth day after birth. The prayer book of the Church of England and of the Protestant Episcopal Church in the United States include a form of service for this rite.

**Church of England**. See **Church, Anglican**.

**Church of God**. See **Second Adventists**.

**Church of God in Christ**. See **Mennonites**.

**Church of God in North America**, or **Winebrennerians**, a Baptist denomination founded by John Winebrenner, pastor, about 1820, of a German Reformed Church in Harrisburg, Pa. In 1830 a new body of churches,

largely the result of the revival, was organized with the statement that the Scriptures are the sole rule of faith and practice, and that there are three ordinances—immersion, washing of feet, and the Lord's Supper.

**Church, States of the, or Papal States**, the name given to the territory in Central Italy which represented the papal ideal of temporal supremacy. By Constantine's edict of Milan in 321 the Church was enabled to hold property and from that time forward its possessions increased until in the time of Gregory the Great (590) the Roman see possessed a considerable amount of landed estate. In 754 the Frankish king, Pepin, rescued Rome from the Lombard king, Aristulf, and gave the lands to the Roman Church. Charlemagne increased these possessions and Pope Innocent III. (1198-1216) further strengthened the temporal supremacy. Alexander VI. (1492-1503) let the Church States sink to the diplomatic level of other Italian principalities, but Julius II. (1503-13) rescued Italy from the hands of the French. In 1797 the French Directory occupied the states, proclaiming a Roman republic; but they were restored to the Pope at the Congress of Vienna in 1815. In 1860 the greater part of the Church territories fell to Italy, and in 1870 the papal dominion came to an end and the Pope's jurisdiction was confined to the limits of the Vatican. This condition of affairs lasted until 1929, when on February 11, a pact between the Holy See and the Kingdom of Italy was signed. This pact recognized the two organizations as separate and independent sovereignties.

**Church Triumphant, The (Schweinfurth)**, a church founded by a Mrs. Beekman of Byron, Ill., who early in the seventies declared herself the 'spiritual mother of Christ in the second coming,' and gathered a body of disciples.

**Churchwardens**, persons appointed in each parish in England for the purpose of caring for the fabric and attending to the other temporal affairs of the church. In the Protestant Episcopal Church of the United States they are elected by each parish annually.

**Churchyard Beetle (Blaps)**, a genus of dark-colored and inactive beetles, found in England and elsewhere in damp localities.

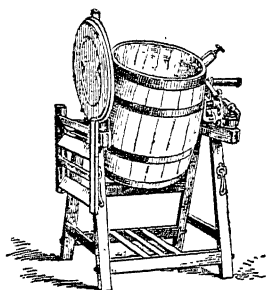
**Churl**. See **Ceorl**.

**Churn**, the name given to a variety of closed vessels used for agitating milk or cream, in order to cause the fatty globules to coalesce into butter.

**Churubusco**, a small village about 6 m. s. of the city of Mexico, on a river of the same name; the scene of an American victory, Aug. 20, 1847, during the Mexican War.

**Chuvashes**, or **Tchuvashes**, numbering some 540,000, possibly Finnish, but more likely Turkish in origin, occupy parts of E. Russia.

**Chu-yung-kuan**, customs station in the Nankou Pass; famous for its polyglot inscription.



Barrel Churn.

**Chyle**, the milky fluid contained in the lacteals after the digestion of food.

**Chyluria**, a milky, coagulable condition of the urine, due to the presence of chyle.

**Ciano, Count Galeazzo** (1903-1944), son-in-law of Mussolini; son of the president of the Italian Chamber of Deputies; Minister of Foreign Affairs; Ambassador to the Vatican; member of Fascist Grand Council. He voted to oust Mussolini (1943) and was executed as a traitor January 1944, in Verona, capital of the Nazi-manipulated Fascist 'Republic.'

**Cibber, Colley** (1671-1757), English actor, dramatist, and poet laureate. Cibber became poet laureate, and, as such, wrote some of the worst odes in the language. Having by a thoughtless jest wounded Pope, a quarrel ensued. To this quarrel he owed his elevation to the throne of Dullness in the *Dunciad*. His *Apology* is one of the best and most entertaining of autobiographies. See the *Apology for the Life of Mr. Colley Cibber*, ed. R. W. Lowe; Disraeli's *Quarrels of Authors*.

**Cibrario, Luigi, Count** (1802-70), Italian historian and statesman, born at Turin. He was minister in various cabinets, especially under Cavour, and was made count in 1861. Among his many historical works are *Dell'Economia Politica del Medio Eva*. See *Life*, in Italian, by Odovici.

**Cicadas**, large bugs, which feed on plant juices, and occur only in the warmer parts of

the globe. They are the most noisy of insects, apparently singing in rivalry with one another. The *Cicada septendecim* of America is probably the longest-lived of insects, the young form living from thirteen to seventeen years underground before emerging. The common noisy, green cicada or 'locust' of the Eastern United States is, however, a different species (*C. tibicen*), and short-lived.

**Cicatrization** (Lat. *cicatrix*, 'a scar'), the formation of fibrous tissue which is the end of the healing process of a wound.

**Cicero. (1.) Marcus Tullius** (106-43 B.C.), was the greatest orator and man of letters produced by ancient Rome, and one of the leading statesmen in the last days of the republic. He was born on Jan. 3, 106 B.C., near Arpinum, the birthplace of Marius. His prosecution of Verres gave him the first place among Roman orators. In 63 he became consul, and performed his greatest service to the state by putting down the conspiracy of Catiline. For the next two years he was the leading man in Rome; but Clodius too attacked him, bringing forward a bill to banish any person who had put Roman citizens to death untried. This Cicero had done in executing the accomplices of Catiline. He left Rome and retired to Greece, but in 57 he was recalled by the unanimous vote of all Italy. In 51 he reluctantly became governor of Cilicia, and in 50 decided to join Pompey, whom he accompanied to Greece. After the battle of Pharsalia (48 B.C.), Cicero returned to Italy, and was kindly received by Cæsar. After Cæsar's murder he vigorously attacked Antony in his Philippic orations. In revenge for this, when Antony and Octavius formed the second triumvirate, they proscribed Cicero. He endeavored to escape, but was overtaken by Antony's soldiers near Formiæ, and offered his neck to the executioners, Dec. 7, 43 B.C.

Cicero had many friends, notably Atticus. It is in his correspondence to them that he reveals his nature to us most freely. He had many weaknesses, but for his playfulness, his humor, his wit, his kindliness, his affectionate disposition, and for the higher qualities of humanity, conscientiousness, uprightness, and adherence to what he held to be his duty, he has gained the admiration and respect of all ages. The list of his works is too long to be given in full; they may be divided into the following classes:—(1) Oratorical works, fifty-six in number, of which the speeches against Verres, against Catiline, and the Philippics are the best; (2) seven works on rhe-

toric, especially the *De Oratore*; (3) philosophical works, nine in number, of which the *De Officiis* ('On Duties') and the *De Finibus* ('On the Chief Good') are the most important; (4) political works, two in number, the *De Republica* ('On the State') and the *De Legibus* ('On Laws'); (5) epistles, over eight hundred in number, covering the period from 68 to 43 B.C.; they are divided into three classes—those to Atticus, to various friends (*Ad Familiares*), and to his brother Quintus.

(2.) **QUINTUS TULLIUS** (102-43 B.C.), the younger brother of the above, was ædile in 67 B.C., prætor in 62, and then for three years governor of the Roman province of Asia. He was proscribed by the triumvirs, and put to death in 43 B.C.

(3.) **MARCUS TULLIUS**, son of the great orator and Terentia, was born in 65 B.C. He served with credit under Brutus and Cassius. Augustus made him his colleague in the consulship in 30 B.C.

**Cicerone** (Ital.; from Lat. *Cicero*), in Italy a guide who conducts strangers through the collections of art, etc.

**Cicester.** See **Cirencester**.

**Cid Campeador** (1040-99), whose real name was RUY DIAZ DE BIVAR, a Castilian noble and soldier of fortune. His romantic title is compounded of the Arabic *saiyid*, 'lord,' and Spanish *campeador*, 'challenger' or 'champion.' Born at Bivar, near Burgos, he became a standard-bearer in the army of Sancho II. of Castile. Alfonso succeeded to both thrones, and in 1081 Ruy Diaz was banished from Castile, and took service with the Moorish king, Muktadir of Saragossa, whose armies he led against the Christians. He conquered the northern portion of Moorish Valencia for the king of Saragossa. The king of Valencia then appealed to the Cid for help. The Cid promised to recover Valencia if he were allowed the whole booty of the city; but when he had won the place he held it on his own account. Thenceforward for years, with a chosen body of 7,000 desperadoes, the Cid overran, from Valencia, all Western Spain, exacting tribute and ransom on his own account. Alfonso VI. attempted to check the power in Valencia of his great subject; but the Cid invaded Castile, burning, slaughtering, and plundering, until Alfonso was glad to let him alone at Valencia. This city, which had shut its gates against him, he recaptured in 1094; and thenceforward till his death, in 1099, the Cid reigned there as an independent king. The famous *Poem of the Cid*, the first great epic in the Spanish tongue, modelled on the

French *chanson de geste*, was written about forty years after the Cid's death, the *Chronicle of the Cid* and other narratives being of later date.

**Cider** is the fermented juice of the apple. The manufacture consists in crushing the apples and squeezing out the juice. The juice is poured into casks, where it ferments and clears itself of impurities. It possesses a characteristic flavor of apples, and is termed rough or sweet cider, according to the amount of sugar and tannin it contains. The solid pulp cake from the first pressing still contains considerable juice and sugar. This may be broken up in water and a second pressing made. Cider made from the juice thus obtained is low in alcoholic content and of poor quality and is sometimes referred to as 'small cider.' The pressed pulp is known as apple pomace. It has been found to have feeding value for dairy cows. It keeps well in a silo. See also *Bulletins of U. S. Department of Agriculture*.

**Cienfuegos**, town and harbor, Cuba. Center of sugar export. It has wide, well-paved streets, spacious public squares, and is lighted by gas and electricity. It is the seat of two hospitals, a theatre, and has good civic buildings. Admiral Schley blockaded it during the Spanish-American War; p. 39,017.

**Cigars and Cigarettes.** See **Tobacco**.

**Cigoli**, properly **Lodovico Cardi** (1550-1613), Italian painter and architect. He developed his art by studying Andrea del Sarto and Correggio. As architect, he finished the Pitti Palace at Florence. For chief works, see Champlin and Perkins's *Cyclopædia of Painters*.

**Cilia**, in biology, are whiplike processes often found fringing cells, both in the Protozoa and in many-celled animals, and capable of very free movement.

**Ciliary Body.** See **Eye**.

**Ciliata**, an order of Protozoa characterized by the presence of cilia, and of a distinct outer layer or cortex.

**Cilicia**, a region in the s.e. of Asia Minor, now the valley of Adana and Tarsus. Soli and Tarsus were important centres of Greek civilization. The older inhabitants, who had retired to the mountainous western district, gained great notoriety as pirates in Roman times.

**Cilician Gates**, historic pass across the Taurus range, Asia Minor, leading from the central plateau to the valley of Adana and Tarsus.

**Cima, Giovanni Battista** (?1460-1518), called CIMA DA CONEGLIANO, from his birth-

place; Italian painter, a pupil of Giovanni. Cima restricted himself to sacred subjects and a few classical pictures. In Venice is his *St. Thomas Touching the Wounds of Christ*, by many esteemed his masterpiece. See Ruskin's *Modern Painters*.

**Cimabue, Giovanni** (1240-1302), Italian painter, born in Florence, and styled the 'father of modern painting,' being in reality the meeting-point between the Byzantine and early Italian art. In style a follower of the Byzantine tradition, he anticipated the change in spirit, and influenced and encouraged the real pioneer, Giotto. Cimabue's most important Madonnas are in Florence, but one is in the Louvre, and one in the National Gallery, London. Some of the frescoes in the church of St. Francis, Assisi, are attributed to him; also part of a mosaic at Pisa.

**Cimarosa, Domenico** (1749-1801), an Italian operatic composer, born at Aversa, near Naples. *Il Martimonio Segreto* (1792), his finest work, is the only one by which he is now known.

**Cimbri**, a people of Germanic nationality, who came from the Chersonesus Cimbricus, modern Jutland. The best authorities have given up the idea of their Celtic origin, which was suggested by the similarity of their name to that by which the Welsh call themselves, Cymry. After wandering north of the Danube they passed through Switzerland into Gaul. Fortunately for Rome, they then invaded Spain, and remained there for two or three years. Later they crossed the Alps, entered Italy. See Mommsen's *Hist. of Rome*.

**Cimmerii**, the name given by Homer to a legendary people who lived in the farthest west, on the banks of the ocean stream, in darkness and mist. The name is also given to a historical people who dwelt on the shores of the sea of Azov and in Asiatic Sarmatia. Their name is still retained in Modern Crimea.

**Cimon**, (515-449 B.C.), famous Athenian general, son of the great Miltiades, early distinguished himself in the patriotic struggle against the Persians. The hereditary enemy of Persia, it was his policy to advocate a close alliance with Sparta; and when the Helots revolted, he twice led an army to the support of the Spartan troops; but on the latter occasion, having lost the confidence of his allies, he was dismissed. After his return to Athens his policy was opposed by Pericles, who procured his banishment by ostracism. Recalled in 457, he again led an expedition against the Persians, who gained a complete victory. Cimon, however, died just before the engage-

ment. Consult Perrin's *Plutarch's Cimon and Pericles* (1910).

**Cinchona**, or more properly **Chinchona**, a most important genus of trees and shrubs, of the order Rubiaceæ, from the bark of which the important alkaloid quinine and its congeners are obtained. The genus includes some thirty or forty species native to the Andes, where they grow at altitudes of 2,300 to 9,000 feet.

The removal of the cinchona bark for commercial purposes is a laborious and difficult operation. The method is to remove the trunk bark from trees six years old or more by taking it off in strips, and drying it in quills. The denuded parts are then covered with moss, which not only protects the new-bark formation, but nearly doubles the alkaloid yield by shielding the bark from the direct rays of the sun.

The world's chief supply of cinchona bark is derived from the cultivated forests of Java, India, New Zealand, Ceylon, and Queensland. The chief and most valuable alkaloid is quinine, associated with quinidine, cinchonidine, and cinchonine in varying proportions.

The Cinchona tree was first imported into Europe in 1639, by the countess of Chinchon, the wife of the viceroy of Peru, who had been cured of an obstinate intermittent fever by means of it, and who thereafter habitually distributed it to those suffering from fever. The Jesuit missionaries afterwards carried it to Rome. Having fallen into practical disuse in Europe, it was again brought into notice by an English apothecary, who acquired great celebrity through the cure of intermittent fevers by its use. In 1678 he cured Charles II. of a tertian fever. In 1679 he similarly cured the Dauphin and other eminent personages on the Continent, and thus induced Louis XIV. to purchase his secret. The adoption of the drug was henceforth assured. The discovery of the alkaloids on which its properties chiefly depend did not take place till the beginning of the nineteenth century. See QUININE, CINCHONINE.

**Cinchonine**, **Cinchondine**, two isomeric alkaloids, of formula  $C_{10}H_{22}N_2O$ , present in cinchona bark, from which they are isolated after the removal of the quinine and quinidine. See CINCHONA; QUININE.

**Cincinnati**, city, Ohio, county seat of Hamilton co., is situated in the southwest corner of Ohio, on the north bank of the Ohio River at the point where the three State lines of Ohio, Indiana and Kentucky meet. The city covers an area of 72.5 square miles and

has a river front of 23 miles. The Metropolitan Area is 519.56 sq. m. Its altitude ranges from 432 to 960 feet above sea level, thus occupying a broken and irregular site. On the lowest ground are the principal warehouses and manufacturing establishments; the best residential districts are on higher lands toward the crescent of picturesque hills which enclose the city on the north, east and west, while the business section, the most densely built part, occupies the middle ground between.

Cincinnati owns one of the finest pumping and filtering plants in existence, located at California, Ohio, a short distance up the Ohio River. Latonia Race Course, Kentucky, is six m. distant from the city. Eden Park is the site of the Art Museum, containing a rare collection of sculpture, paintings, etchings, textiles, ceramics, metal work, carvings, costumes, arms, musical instruments, etc., ancient and modern. The Barnard Lincoln statue in Lytle Park was presented to the city by Mr. and Mrs. Charles P. Taft, and is considered the most life-like of any effigy of the great emancipator. The Observatory, near Ault Park, has one of the largest telescopes in the country. The Zoological Gardens stand among the oldest in America and claim to hold the finest and most complete collection of animal and bird life in the country. The gigantic Union Terminal cost approximately \$75,000,000; while the Rail River Terminal, headquarters of the Mississippi Valley Barge line, is the largest of its kind on the river.

Cincinnati's educational institutions include the University of Cincinnati, owned by the city; the Cincinnati Observatory and the Astronomical School affiliated with the University; Ohio Mechanics' Institute, offering literary, scientific, and industrial courses; St. Joseph's and St. Francis Xavier's Jesuit Colleges, Hebrew Union College, the Cincinnati College of Music; the Cincinnati Conservatory of Music; and the Cincinnati Art Academy located in the Cincinnati Art Museum.

The art and the music of Cincinnati are well known; its woodcarving and decorative pottery, from the Rookwood galleries have a national reputation; the Cincinnati Symphony Orchestra ranks with the greatest orchestras in the United States, and the biennial May music festivals, instituted by Theodore Thomas in 1873, are contributed to by the best talent in the country and are largely attended.

Twelve railroad lines serve Cincinnati and more than 3,000 industries are situated in the

city, including tobacco factories, machinery, iron, steel and brass products, printing equipment, airplanes and airplane motors, chemicals, paints, leather goods, paper, pottery, shoes, jewelry, clothing, radios, furniture, and sporting goods.

The city manager form of government obtains in Cincinnati, with the Hare system of proportional representation for selecting members of council, consisting of nine members, one of whom is chosen mayor by the council body; p. 455,610.

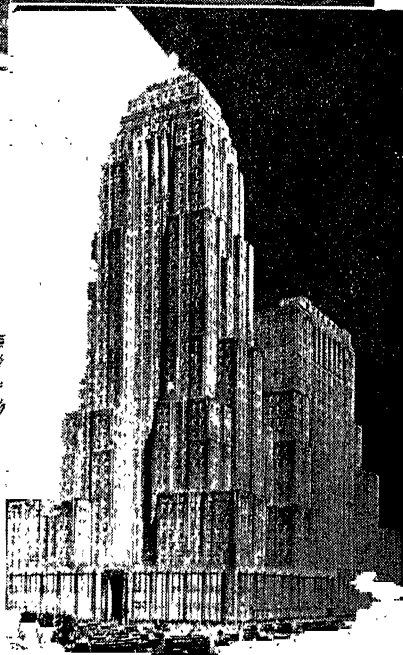
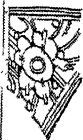
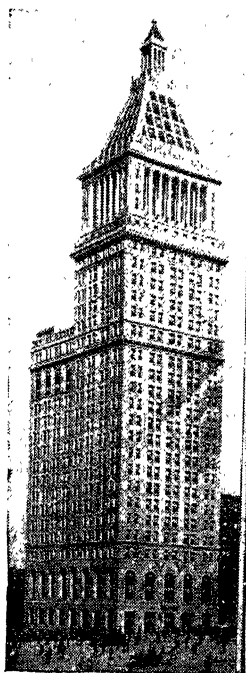
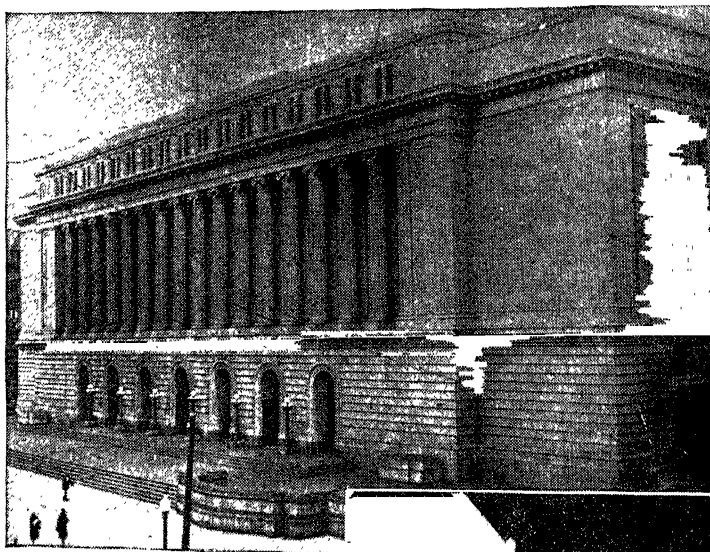
Cincinnati has had costly and unpleasant experience from high water in the Ohio River. The flood of January 1937 is notable in the city's history, as the river then rose to a record breaking high and caused much suffering and damage. The magnificent union railroad terminal was completed and dedicated in 1933.

It is believed that the site of Cincinnati was occupied in prehistoric times by a considerable aboriginal population, mounds, containing various relics appearing to confirm this opinion. Cincinnati was first settled by white men in 1780, was permanently occupied in 1788, and was named in honor of the Society of the Cincinnati in 1790; it was incorporated in 1802; and became a city in 1819. Following the beginning of steam navigation on the Ohio River, in 1816, and the opening of the first railroad in 1845, the growth was rapid and owing to its attractiveness and prosperity the city early won the name of 'The Queen City of the West.'

Consult Greve's *Centennial History of Cincinnati* (1904); Goss' *Cincinnati, The Queen City* (1912); Leonard's *Greater Cincinnati and Its People* (1927).

**Cincinnati, Society of the,** a society or order established by the officers of the Revolutionary army of the United States in 1783, 'to perpetuate their friendship, and to raise a fund for relieving the widows and orphans of those who had fallen during the war.' It was so named because it included patriots, headed by Washington, who in many instances had left rural affairs to serve their country. (See CINCINNATUS). All officers of the Continental Army who had served for three years, or who had been disabled and honorably discharged, and all French officers who had ranked as high as colonel in the French army serving in America, or who had commanded a French War vessel or fleet, were eligible for membership in the society, and such membership was declared hereditary.

For some time after its organization the



*Cincinnati Views.*

Upper, Court House; Left, Office Building; Right, Fountain Square Building.

society was vigorously assailed throughout the United States, its opponents regarding it as the beginning of an hereditary aristocratic order which would be comparable to the hereditary orders of nobility in European countries, and in 1789 the Tammany Society of New York was formed in opposition to it. See TAMMANY HALL.

There is a branch society in each of the thirteen original States and one in France. In 1938 the widow of Larz Anderson, former ambassador to Japan, presented the society with a handsome property in Washington, D. C., for a national headquarters.

**Cincinnati Symphony Orchestra**, one of the foremost orchestras in the United States, originated in the formation, in 1893, of the Cincinnati Orchestra Association.

**Cincinnati, University of**, a municipal institution for higher education located in Cincinnati, Ohio, chartered in 1870. It includes the McMicken College of Liberal Arts; a Medical College; a School of Nursing and Health in the College of Medicine; a Law College; the Cincinnati Observatory; a College of Engineering and Commerce; a College for Teachers.

**Cincinnatus, Lucius Quintus**, one of the old Roman heroes of the early legendary days of the republic. In 485 B.C. he was called from ploughing his land, as the story goes, to become dictator, the Roman consul and army having been cut off by the Æquins. He defeated the enemy, saved the army, and returned to his farm in 16 days.

**Cinderella**, heroine of an ancient fairy tale. Abused by her step-sisters, and made the household drudge, Cinderella is arrayed for the Prince's ball by her fairy godmother, who warns her to leave by midnight. As she is fleeing from the palace, she loses one of her tiny glass slippers. The Prince, finding it, seeks its owner and tracing it to Cinderella, makes her his bride.

**Cineas**, of Thessaly, friend and minister of Pyrrhus, king of Epirus, and one of the ablest diplomatists and speakers of his time, is best known for his mission to Rome in 280 B.C., after Pyrrhus' victory at Heraclea.

**Cinematograph**, an instrument for projecting a series of instantaneous photographs of a moving scene in such rapid succession that they reproduce the action in a lifelike manner upon a screen. The name was first given by Lumière of Lyons, France, to a machine which made the original exposures, printed the positive film from the negative,

and finally projected the pictures upon the screen. See MOVING PICTURES.

**Cineraria**, a genus of herbaceous composite plants, closely allied to Senecio, its most important members being the numerous hybrids obtained by florists from *C. cruenta*, a purple-flowered species of the Canary Islands.

**Cinerary Urns**, hand-made vessels of clay, sun-dried, and containing the calcined bones left after cremation, abundant as relics of the stone and bronze ages throughout Northern Europe. See CREMATION.

**Cingalese**. See **Sinhalese**.

**Cinna, Caius Helvius**, a Latin poet, who appears to have been tribune in 44 B.C., was killed while attending Cæsar's funeral procession by the people, who mistook him for L. Cornelius Cinna, the prætor.

**Cinna, Lucius Cornelius**, (died 84 B.C.), a Roman patrician, one of the principal supporters of Marius. In 87 Sulla, after driving Marius from the city, allowed Cinna to be elected consul on condition that he not disturb the Constitution. Immediately after assuming office, Cinna impeached Sulla. Cinna and Marius next declared themselves consuls after a massacre of Roman citizens. Cinna was murdered by his own troops at Brundisium. Cinna's daughter was married to Julius Cæsar in 83 B.C.

**Cinnabar**, native mercuric sulphide, HgS, the most important ore of mercury and the principal source from which it is obtained. The principal localities in which it is obtained are Almaden in Spain, Idria in Carniola, and California and Texas, which are the only producers, in the United States, although the ore is known in several other States.

**Cinnamic Acid**,  $C_6H_5CHCHCOOH$ , exists in the free state in the balsams of Tolu and Peru, in liquid storax, and in gum benzoin. Oil of cinnamon is the aldehyde of cinnamic acid, and is represented by the formula  $C_6H_5CHCHCOH$ . From a chemical point of view, the cinnamic acid and oil of cinnamon are related to benzoic acid and oil of bitter almonds. Benzoic acid is regarded as  $C_6H_5COOH$ , while oil of bitter almonds is the corresponding aldehyde  $C_6H_5COH$ . On oxidation cinnamic acid is changed into benzoic acid. Cinnamic acid is either extracted from storax or prepared synthetically by heating benzaldehyde with acetic anhydride and dehydrated sodium acetate.

**Cinnamon**, the dried aromatic bark of several species of the genus *Cinnamomum*, of the order Lauracæ, cultivated in Ceylon



Java, the West Indies, Brazil, Egypt, and the Malabar Coast. The most important species is the Ceylon cinnamon tree, allied to the camphor tree, the cassia, and other aromatic plants. The cinnamon tree naturally attains a height of 20 to 30 ft. but the cultivated trees are not allowed to grow higher than 10 ft. The bark is of a grayish-brown color, internally of a yellowish red. The fruit is brown when ripe, and somewhat like an acorn in shape. The finest cinnamon is yielded by the



*Cinnamon.*

younger branches of the tree, especially by the numerous shoots which spring up from the stump after a tree has been cut down. The smell is delightfully fragrant, and the taste pungent and aromatic, with a mixture of sweetness and astringency. It is used like other spices by cooks and confectioners, and also in medicine as a tonic, stomachic, and carminative.

The constituents of cinnamon are a volatile oil, tannin, starch, mucilage, woody-fibre, resin, coloring matter, with an acid. Oil of cinnamon is extracted by a process of distillation. It is largely used in the preparation of perfumery. Oil of cinnamon leaf is prepared from the leaves, and is met with in commerce under the name of clove oil, which it much resembles in odor. The fruit yields a concrete oil, called cinnamon suet, which is highly fragrant.

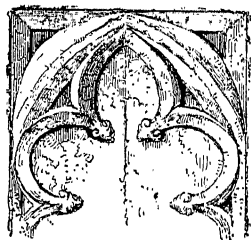
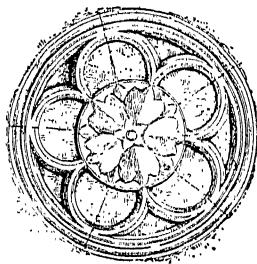
**Cinnamon Stone**, also known as **Essonite** or **Hessonite**, is a mineral of the garnet group, a lime-alumina garnet,  $\text{Ca}_2\text{Al}_2\text{Si}_2\text{O}_{12}$ , which has to some extent been used as a precious stone. It is hyacinth-red or cinnamon in color, and very beautiful.

**Cino da Pistoja**, (1268-1336), Italian poet and lawyer, was born at Pistoja. Consult Rossetti's *Dante and His Circle*.

**Cinq-Mars, Henri Coiffier de Ruse, Marquis de**, (1620-42), French nobleman and conspirator, favorite of Louis XIII; was executed for his participation in a plot to murder Cardinal Richelieu.

**Cinque-cento**. This term, an Italian abbreviation for the year 1500, describes the change of mode and thought regarding art which arose in Italy as one of the consequences of the revival of letters. Gothic architecture had already in the 15th century shown signs of deterioration. In the 16th century, with one impulse, the mind of the Italian people sprang back over the fifteen hundred years of Gothic art and expression into the heart of classic taste and art. Roman and Grecian detail were applied to modern methods of building with freedom and spirit, and the result exhibited both vigor and life. The best-known examples are: St. Peter's and the Vatican palace, in Italy; in France, the Louvre, and many others; in England, St. Paul's, London.

**Cinquefoil**, in architecture, a Gothic ornament much employed in the stone decoration of windows or panels.



*Two Forms of Cinquefoil.*

**Cinque Ports**, seaports of S.E. England possessing peculiar privileges and a special history. The origin of the Cinque Ports may possibly be traced back to the days of Roman rule in England. After the Norman conquest these same ports were made the object of attack by the Danes, and in return for their services then and previously they were

given certain privileges. In 1300 Gervase Alard first took the title of 'admiral of the fleet of the Cinque Ports.' The lord warden of the Cinque Ports, with official residence at Walmer, still exercises maritime jurisdiction and has certain other official functions. See Clowes's *The Royal Navy* (1897).

**Cinthio**, the name assumed by **Giambattista Giraldi** (1504-73), Italian writer, born at Ferrara. He wrote nine tragedies on the Senecan model, full of horrors.

**Cintra**, tn., prov., Lisbon, Portugal, 14 m. by rail n.w. of Lisbon; a favorite summer residence; p. 5,918.

**C. I. O.**, Committee for Industrial Organization, representing the industrial unionists, organized in Nov., 1935, under leadership of John L. Lewis. After conflicts with the American Federation of Labor (representing the craft unionists) this new institution was launched to organize the workers in the mass production industries into industrial unions. In Jan., 1937, C. I. O. inaugurated a 'sit-down' strike in the General Motors plant, which was ended in Feb., by a compromise agreement. In March, strikes in the Carnegie Steel, Chrysler, and U. S. Steel plants were settled with concessions favoring collective bargaining. Name changed, 1938, to Congress of Industrial Organizations. During World War II National Defense was jeopardized by strikes in vital war industries. July, 1944, the C. I. O. formed a 'political action' committee (P. A. C.), which was headed by Sidney Hillman.

**Cipriani, Giambattista** (1727-85), Florentine artist. His fame rests on his drawings, as engraved by Bartolozzi.

**Circars, The Northern**, a tract of country within the Madras Presidency, India. It includes the districts of Ganjam, Vizagapatam, Godavari, Krishra, and Nellore.

**Circassia**, a region in the W. Caucasus between the Black Sea and Mt. Elbruz. Circassia was, 1829, surrendered by Turkey to Russia. Long opposing a stubborn resistance to Russian rule, the Circassians were finally subdued, 1859-64. See Ernest Chantre's *Recherches Anthrop. dans le Caucase*.

**Circe**, daughter of Helios and Perse, was famed for her magic arts; lived in the mysterious isle of *Ææa*, to which Odysseus and his companions came, and she bore him a son, Telegonus. See the *Odyssey*.

**Circinus**, 'the Compasses,' a small southern constellation placed by Lacaille near the forefeet of the Centaur.

**Circle**, the most familiar of all curves,

being usually defined as a plane figure bounded by a line known as the circumference, which is everywhere at the same distance from a particular point called the center of the circle. See M'Clelland's *Geometry of the Circle* (1891); Casey's *Sequel to Euclid*.

**Circles of Stone.** In all cases where competent excavation has been conducted within stone circles, relics have been yielded pointing to sepulchral interment during the bronze age. Megalithic circles are frequent in Algeria, numerous and important in Denmark and Sweden, but attain their greatest development and numbers in the British Isles. The most remarkable are the circle of Stonehenge, having 30 pillars on the outer ring, five groups of trilithons, and a so-called altar-stone, the whole surrounded by a trench; at Avebury, where the trench encloses a space 1,200 ft. in diameter, containing two double concentric circles of stones within an outer ring of 90 stones; Arbor Low, Stanton Drew, the circle on Burn Moor, Cumberland, and that at Bosca-wen. In Scotland, the best examples are the Standing Stones of Stennis, Orkney, which consist of two groups—the ring of Brogar, 340 ft. in diameter, which originally contained 60 stones, with a broad trench intersected by a causeway; and the ring of Stennis, 104 ft. in diameter, and having 12 stones. At Callernish, in the Lewis, are circles connected with stone avenues; and several circles at Tormore in Arran, excavated in 1864, were found to be sepulchral. There are over 300 sites in Aberdeen and Kincardine shires alone. See Fergusson's *Rude Stone Monuments*, 1872; Anderson's *Scotland in Pagan Times: the Age of Bronze*.

**Circuit, Electric.** See **Electricity**, **Current**.

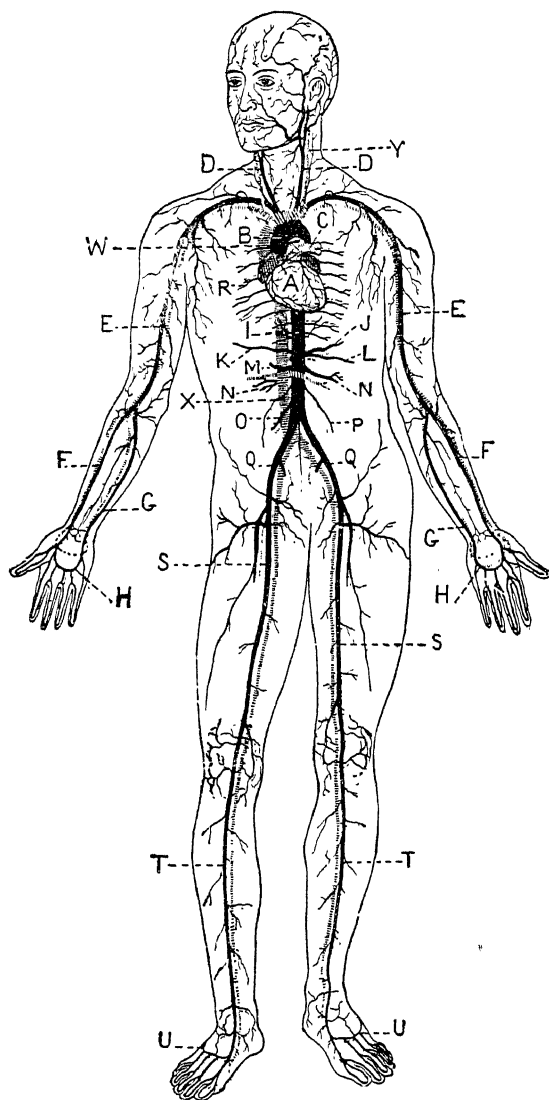
**Circuits**, a legal term that is very old and is used in both England and the United States. It is applied to a certain portion of the country to which a particular judge is assigned. It is then his duty to visit this circuit to try causes arising therein. See **COURT**.

**Circular Notes** are issued by bankers for the use of customers travelling abroad, and in connection with a letter of credit.

**Circulating Decimals.** See **Decimals**.

**Circulation.** See **Money**.

**Circulation of the Blood—Human.** The circulation of the blood was first demonstrated by Harvey early in the 17th century, 1628. He published at that time his *Exercitatio de Motu Cordis et Sanguinis* which is one of the monuments of scientific literature. The circulatory system may be considered as double.



*The Systemic Circulation of the Blood in Man.*

(Arteries shown in solid black and veins in broken lines.) A, Heart. B, Ascending aorta. C, Pulmonary artery. D, Carotid artery. E, Brachial artery. F, Radial artery. G, Ulnar artery. H, Palmar Arch. I, Descending aorta. J, Gastric artery. K, Hepatic artery. L, Splenic artery. M, Superior mesenteric artery. N, Renal artery. O, Inferior mesenteric artery. P, Spermatic artery. Q, Iliac artery. R, Intercostal artery. S, Femoral artery. T, Tibial artery. U, Plantar arch. W, Superior vena cava. X, Inferior vena cava. Y, Internal jugular vein.

being composed of a systemic (general) and a pulmonary (lung) system of blood-vessels. Each system consists of arteries, capillaries, and veins, and of a pump formed by two of the four chambers of the heart. Arteries are hollow, elastic tubes which carry blood from the heart. They divide and subdivide, their ultimate divisions being the capillaries. The walls of these last are sufficiently thin and delicate to allow of an interchange of gases taking place between the blood and the tissues. Part also of the fluid portion of the blood can pass through, so that every part of the body is bathed and irrigated by blood-lymph. The stream of blood flowing through these vessels is constant, the elasticity of the arterial walls maintaining the blood-pressure.

The capillaries join together to form venous radicles, and these in turn unite to form small veins, which coalesce to form larger ones. The pulmonary capillaries surround the air vesicles of the lungs, and in these capillaries the impure blood exchanges its carbon dioxide for fresh oxygen from the air within the vesicles. See RESPIRATION.

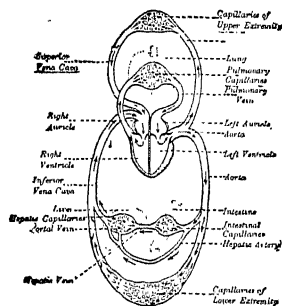


Diagram of the Circulation.

The heart is the muscular pump which, by alternately contracting and dilating, maintains the circulation of the blood. The pulmonary and systemic circulations may be diagrammatically represented as the two loops of a figure 8, the heart being situated where the loops meet. The superior vena cava brings the blood from all the organs above the level of the heart. The inferior vena cava brings back the blood from the lower limbs and from the organs below the cardiac level, except the stomach, the intestine, the spleen, and the pancreas. The venous blood from these organs is gathered into veins which unite to form a single trunk, the portal vein. The liver is a storehouse for many of the products of digestion, and the venous blood

carrying these products from the stomach and intestine is distributed by the portal vein to the liver, where it mingles in the capillaries with blood from the hepatic artery. The hepatic capillaries unite to form small veins, and these form a single trunk, the hepatic vein, which opens into the inferior vena cava.

The heart derives its blood supply from the coronary arteries which spring from the root of the aorta. The blood from the heart capillaries is poured by the coronary vein directly into the right auricle. In mammals generally the circulation is in essentials the same as in man. Only in birds and in mammals is there a complete separation of the right and left sides of the heart, and therefore of the arterial and venous systems, which only communicate through capillaries. In regard to the venous system, there is the same increase in specialization as we rise through the vertebrate phylum. In invertebrates, the heart, when present, is dorsal instead of ventral, and contains pure blood only, its function being to drive this to the body. The venous system is always lacunar, and the red blood-pigment of vertebrates (hæmoglobin) is only rarely present. See Packer and Haswell's *Zoology* (1897).

**Circumcision**, the cutting off of the foreskin, particularly as a religious or ethnic rite; it was a custom of paramount religious import among the Hebrews and has been continued by their descendants. The Egyptians practised it at a very early stage of their history, as did also the Arabs; and it is now practised by all Mohammedan peoples, and by the Copts, the descendants of the ancient Egyptians. Circumcision or some similar custom is likewise found among many widely separated peoples—the Abyssinians and Bantus of Africa, the aboriginal Australians, the islanders of Oceanica and some South American tribes. The distinctive feature of the Hebrew observance was that it was performed in infancy, on the 8th day after birth. Nowadays the Jews employ a professional circumciser, or *mohel*, and the event still maintains its ancient solemnity. As to the origin and purpose of circumcision, we are almost entirely in the dark. Among most of them it has served as a tribal mark and sometimes may have been looked upon as religious in so far as it implied a sacrifice to the deity—a part for the whole. But in most cases it appears to have no religious significance whatever and is almost universally observed at the age of puberty, having to do with initiation into full tribal membership, and being

an act of preparation for marriage. See A. Asher's *The Jewish Rite of Circumcision*, 1873.

**Circumcision, Feast of the,** a festival of the Roman Catholic, Greek, and Anglican churches, on January 1, in honor of the circumcision of Christ.

**Circumpolar Stars.** See Stars.

**Circumstantial Evidence.** See Evidence.

**Circumvallation**, the rampart thrown up round a besieged city. See FORTIFICATION.

**Circus.** (1.) The Latin name of the place in which, anciently, games and horse and chariot races were held. Its shape was that of an ellipse. The center of the space was divided by a wall running lengthways down it, around which the races took place; the sides were occupied by the spectators' seats, rising tier upon tier. The chief circus at Rome, the Circus Maximus, rebuilt by Cæsar, and later by Titus, accommodated 385,000 spectators. Other circuses in Rome were the Circus of Nero, celebrated for the cruelties perpetrated by that emperor against the Christians; and the Circus of Maxentius, built about 311 A.D. by Maxentius in honor of his son Romulus, the only ancient circus still preserved. It is situated on the Appian Way, 2 m. outside the present Porta San Sebastiano. Nearly every Roman town had a circus, after the model of those in the capital. (2.) The modern circus, in which equestrian exhibitions, gymnastic and acrobatic performances, variety by the quips and fooling of the clown, are the chief attractions, dates from the close of the 18th century. Travelling circuses are heard of before 1830 in both England and America, and after 1850 assumed great dimensions, notably Hengler's, Sanger's, and Barnum and Bailey's. Colonel Cody's (Buffalo Bill) Wild West Show is a favorite in many parts of the world. The recent construction of permanent circuses known as Coliseums and Hippodromes has given a new life to the circus, and furnishes a variant on the itinerant show which moves about the country. In Spain, the arena in which bull-fighting takes place is known as the circus. See Thomas Frost's *Circus Life and Circus Celebrities*, 1875.

**Cirencester**, or **Cicester**, mrkt. tn. in Gloucestershire, England. The Royal Agricultural College is here. Cirencester was founded by the early Britons and became a Roman station under the name of *Corinium*; p. 11-500.

**Cire Perdue**, an ancient and delicate

mode of casting bronze statuary, by making a hollow wax model of the figure and enclosing it in plaster. The wax is then melted out by the molten bronze, which takes its place, and thus reproduces the model.

**Cirque.** Alpine or high altitude glaciers have a tendency to gouge out amphitheatre-like excavations on the sides of mountains. These are called cirques.

**Cirrhosis** is a degenerated condition, appearing in the tissues of different bodily organs, such as the liver, lungs, and kidneys, and is due to chronic inflammatory changes. See LIVER, LUNG, KIDNEY, etc.

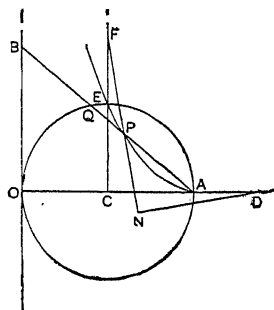
**Cirripedia**, an order of Crustacea, including barnacles and acorn-shells. All are marine, and in adult life are fixed head downward to some solid body. See Packard's *Zoölogy* (1897).

**Cirro-stratus.** See Clouds.

**Cirta.** See **Constantine.**

**Cisalpine Republic**, a former state of N. Italy, formed by Napoleon Bonaparte in 1797, with Milan as its capital. Abolished in 1799, owing to Austrian and Russian victories, it was restored in 1802 as the Italian republic. In 1805 Napoleon was made king of Italy at Milan, the Bourbons being permitted to retain Naples and Tuscany, while papal authority was restored over Rome.

**Cissoïd**, a curve invented by Diocles of Alexandria, more than 70 years before Christ, for finding two mean proportionals. The curve begins at one extremity of the diameter of a circle which has a tangent at the other extremity of the diameter, and is so con-



*Cisoid Curve.*

structed that if any oblique line be drawn from the point of beginning to the tangent, the segment of the line between the circle and the tangent is always equal to the segment between the point of beginning and the cissoid.

**Cist.** See **Barrow.**

**Cistercians**, a monastic order founded in 1098 by a Benedictine abbot, Robert Champagne. The first monastery was established in the forest of Cîteaux, near Dijon, and was governed by the strictest interpretation of the rule of St. Benedict. After St. Bernard joined the order in 1113, it spread rapidly till by the middle of the 13th century there were 2,000 abbeys. Their first establishment in England was Waverley Abbey, in Surrey. Woburn, Tintern, Kirkstall were among the other English abbeys. In Scotland, 11 abbeys and 7 nunneries represented the order. The chief French abbeys were at Clairvaux.

Although founded to represent the true rule of St. Benedict, the Cistercians themselves grew wealthy; and as their wealth increased, the severity of the rule was insensibly relaxed. Disorders crept in, and the order had fallen into decay, even before the Reformation period, and many of their establishments were closed. The Cistercians of the Strict Observance have two houses in the United States.

**Cistern**, a small water reservoir, usually below ground, consisting generally of a closed or covered tank for storing rain water, as distinguished from *well*, *spring basin*, and *infiltration gallery*, which collect water flowing from the earth. Cisterns as used today for rain-water storage are either wooden vats or concrete containers. *Well* is applied similarly, but more often to denote a deep, narrow chamber; whereas cistern is usually applied to a wider and shallower chamber.

**Cistus**, a genus of small flowering shrubs, known as Rock Roses. The flowers, which last but a day, are large, resembling single roses, and their coloring and texture delicate, the range of color being considerable.

**Citadel**, any fort or fortified castle dominating a town. Modern warfare has rendered the ancient citadels practically obsolete.

**Citation**, a legal term used to denote a summons or command directed to the person named therein, calling upon him to do some particular act. In military affairs, special mention in official dispatches, as for bravery, is called a citation.

**Cithæron**, now **Elatea**, a range of mountains which separated Bœotia from Megaris and Attica. It was sacred to Zeus and to Dionysius and was the scene of various legends, such as the exposure of Œdipus and the death of Pentheus.

**Cithara**, an ancient musical instrument

somewhat resembling both a lyre and a guitar. Its invention is attributed to Apollo, and it was used by the Greeks and Romans. The modern guitar and zither are modifications of the cithara.

**Cities of Refuge**, certain cities (three on the w. of the Jordan, three on the e.) appointed by Jewish law as places of refuge for those guilty of unintentional murder until their case could be properly tried, it being the duty of the nearest relative of the slain to kill the murderer. See SANCTUARY.

**Citizenship**. As generally understood, a citizen is a member of a state or nation, owing allegiance to that state and being entitled to certain rights and privileges from the state. Citizenship may be defined as the sum total of those rights and duties which are involved in being a citizen. Citizens are either native-born or naturalized. Native-born citizens, according to the view accepted by some countries, are those born within the state or its dominions, while other countries make the citizenship of the parents the determining factor. According to the Fourteenth Amendment of the U. S. Constitution 'all persons born or naturalized in the United States, and subject to the jurisdiction thereof, are citizens of the United States and the State wherein they reside,' and this holds even in the case of children born of alien parents who are themselves excluded from the right of citizenship. The United States recognizes also as native-born citizens, children born abroad of American parents. International usage assumes that children of diplomatic representatives, wherever born, are native to the lands their fathers represent. Naturalized citizens are those who, originally aliens, acquire citizenship through the satisfying of certain requirements prescribed by law. In the United States citizenship is open on these terms to white persons and persons of African birth or descent, certain undesirable classes—as criminals, anarchists, and others—being excluded. See NATURALIZATION.

Certain expressions in the Constitution of the United States imply a Federal citizenship, and others a State citizenship. Subject to the restrictions imposed by the Constitution, and excepting only those powers and immunities which arise out of Federal citizenship, the State possesses the exclusive control of the civil and political rights of the individuals resident within its borders. Citizenship does not of itself give the right to vote, but most of the States confer this right upon all U. S. citizens who have lived within the State for

a year and who can meet certain simple requirements. See AMERICANIZATION; NATIONALITY.

**Citlaltepetl.** See **Orizaba, Peak of.**

**Citric Acid** occurs in lemons, limes, and other acid fruits. It is prepared by boiling lemon juice, filtering, and neutralizing the clear liquid with chalk and slaked lime. The calcium citrate which separates is decomposed by dilute sulphuric acid, and the filtrate concentrated till the citric acid crystallizes out. Citric acid forms clear, colorless crystals with a pleasant, sour taste.

**Citron** (*citrus medica*), a small tree cultivated in the Mediterranean countries, especially in Corsica, and to a certain extent in Florida and California. The fruit resembles a lemon, but is larger and has a thicker rind and a smaller amount of acid pulp. The rind is dried and used in confectionary and cookery. Large quantities of it are shipped from Corsica to America to be candied. In the United States a small melon with a firm white center is also known as a citron. It is not edible when raw, but its rind is used for preserving.

**Citronella Oil**, an aromatic oil obtained from lemon grass, cultivated in Singapore and Ceylon. It is used to scent soaps and perfumes, and externally ward off mosquitoes.

**Citrus**, a genus of aromatic evergreen shrubs and trees belonging to the order Rutaceæ, natives of the warmer countries of Asia, and cultivated for their fruit in the Mediterranean countries, Madeira, the West Indies, Florida, and California. Among the species are the orange, lemon, lime, citron, and grapefruit.

**Città di Castello**, town and episcopal see, Italy, province of Perugia. It has a fine Renaissance cathedral (1480-1540); p. 27,713.

**Citta Vecchia**, former capital of Malta.

**City**, a term whose significance has varied greatly in the course of history and still varies in different countries, but which generally signifies a permanently organized community with a considerable number of inhabitants. The ancient Greek city, or more properly 'city state,' was an independent community, consisting of a town and its immediate neighborhood. Its form of government varied chiefly according to the number who were admitted to full citizenship, and might be oligarchic or democratic; but even when it was most democratic, only a fraction of the population had the rights of citizenship. The cities of the Roman Republic were of the same type. In the United States, the term

city is often applied to incorporated towns above a certain size. Technically, however, a city is created by statute, its charter of incorporation being granted by the State. In America and England it is a well established rule that the city has only those powers which have been specifically granted to it by the state. See CITIZENSHIP; LOCAL GOVERNMENT. Consult Howe's *The City*; Wilcox' *The American City*.

**City Manager Plan.** See **Commission Government.**

**City Planning**, or **Town Planning**, is the term used to describe the mapping and laying out of cities or towns according to a plan which will take into account the different elements in the life of the ideal city, such as transportation, movement of traffic, provision for parks and playgrounds, housing, both industrial and residential, sanitation, landscaping, and regulation of building from the esthetic and community points of view. It starts ideally from the creation of a new city, planned on paper as an architect plans a building, and fitted to natural conditions and requirements. Practically such a state of affairs rarely exists. City planning, as practised in modern life, relates to the improvement of towns and cities already laid out, especially with regard to zoning for residential and business districts; to avoidance of traffic congestion; to planning new public buildings; and especially to long-term projects for the growth of the city. It involves often a scheme for wiping out slums, and for creation of new playgrounds, working always on the idea of a proper balance of buildings and open spaces and a suitable amount of air and light for each unit of population, whether the individual family or the business group. As described, city planning is becoming a distinct profession, studied and practised by specialists.

While city planning is in many ways a modern development, it is possible to find examples of it in the careful geometric laying out of the streets and squares of ancient cities, notably in Egypt, Greece, and Rome. During the Middle Ages town planning was usually somewhat informal except as it related to such features of defense as the fortified town wall, an almost universal feature of the medieval town. The space formerly occupied by these fortified walls has been utilized in some modern instances for an encircling boulevard, as in the famous Ringstrasse of Vienna. The geometric, so-called checker-board, plan was a favorite with certain



CHRYSANTHEMUMS





French and German kings and rulers of the period of the Renaissance.

Modern activity in town planning dates chiefly from the beginning of the 20th century, though the city of Washington is a notable example of an excellent geometric plan well designed and carried out over a long term of years. It was designed in 1791 by Major Pierre Charles l'Enfant, a French engineer acting under George Washington. In 1807 a commission was appointed which laid out the City of New York on hard and fast checkerboard lines, cut diagonally by the somewhat wandering course of old Broadway. The original city between the Hudson and East River was narrower and seemed destined to grow in length, and this system provided for wide n. and s. avenues several hundred ft. apart and narrower cross streets 200 ft. apart running from river to river, with a reserved space, Central Park, in the center of what was then the upper city.

Hartford, Conn., is said to be the first city to establish a permanent city planning commission, a practice followed by some 300 cities in 42 of the States. The Chicago Exposition of 1893 and subsequent expositions are believed to have had much influence along architectural and landscaping lines. City planning has been made necessary by the rapid growth of urban and suburban population; the establishment of large metropolitan areas, and the problems brought about by the tremendous increase in the use of the automobile. Engineering plans, such as the building of subways and elaborate sanitary systems, require such consideration of all the conditions involved in any local undertaking. Local and national emphasis on decent living conditions have made many measures a feature of the programs of the New Deal. Consult the *City Planning Quarterly* for the newest examples of this civic movement; also Nolen's *City Planning* (1916), and *New Ideals in the Planning of Cities, Towns, and Villages* (1919); Hegemann and Peets' *Civic Art* (1922); E. M. Bassett's *Zoning* (1922); Lewis' *The Planning of a Modern City* (1923); Kimball's *Manual of Information on City Planning and Zoning* (1923); Unwin's *Town Planning in Practice*.

**Ciudad Bolivar**, city, Venezuela, capital of the state of Bolivar. It is a prosperous, well built town and an important commercial center. The town was generally known as Angostura until 1846; p. 19,712.

**Ciudad Juarez**, or **El Paso del Norte**,

town, Mexico, state of Chihuahua. Founded in 1585 as a missionary station it is now an important place for transit trade; p. 20,000.

**Ciudad Porfirio Diaz**, now known as Piedras Negras, city, Mexico. An international bridge crosses the Rio Grande at this point. Diaz is a garrison town and the seat of a United States consulate; p. 15,000.

**Ciudad Real**, city, Spain, capital of the province of the same name and an episcopal see. Its chief feature of interest is a huge Gothic church without aisles; p. 16,000.

**Ciudad Real**, province, Spain, in the s. central part, between Sierra Morena and the mountains of Toledo, with an area of 7,620 sq. m. The mountains abound in minerals. Grapes for the famous wine of Valdepeñas are grown here; p. 427,365.

**Ciudad Rodrigo**, fortified town, Spain. It has a Gothic cathedral dating from the 12th century; p. 10,000.

**Ciudad Victoria**, city, Mexico, capital of Tamaulipas state. Sugar raising and refining is an important industry. The city is the residence of an American consul; p. 20,000.

**Civet**, **Civet Cat**, the name given to the members of the Old World genus *Viverra*, of which two species especially, *V. civetta* and *V. zibetha*, yield the civet of commerce. Civets are small carnivores, closely related to the cats. The characteristic musky perfume is due to the secretion of two large glands near the anus. Large numbers are kept in captivity in Eastern countries for the sake of the secretion, which is used for perfume.



Civet.

**Civic Association, American.** An organization formed in 1904 by the union of the American League for Civic Improvement and the American Park and Outdoor Association. Its purpose is the cultivation of higher ideals of civic life and beauty in America, the promotion of city, town, and neighborhood improvement, the preservation and development of landscape, and the advancement of outdoor art. The association holds annual meetings for the discussion of papers,

which are subsequently published and distributed.

**Civic Federation.** An association composed of employers and employed, and of other persons interested in social and industrial progress. Its earlier service was chiefly in the averting of strikes, as in the case of a threatened anthracite strike in 1901. Its later work has been more varied, with study by commissions of European labor conditions, and stimulation of good citizenship. See *The National Civic Federation Review*.

**Civil Damage Acts,** statutes passed in a number of the United States, giving to the husband, wife, parent, child, or guardian, for injuries done by intoxicated persons, the right to sue those who may have sold or given the liquors which caused the intoxication. Also for injuries to means of support, for the expense and trouble of caring for the intoxicated person, and for other injuries and losses pointed out in the statutes.

**Civil Engineers.** See **Engineering, Civil.**

**Civil Engineers, American Society of.** It was founded in 1852 with headquarters in New York City. It holds bi-monthly meetings and publishes monthly *Proceedings*.

**Civil Engineers, Canadian Society of.** An organization founded in 1887, with headquarters in Montreal.

**Civil Engineers, Institution of.** A British institution, founded in 1818 for the advancement of mechanical science, and the training of civil engineers.

**Civil Rights Acts,** two acts passed by the U. S. Congress, the first in 1863, the second in 1875, for the purpose of conferring civil rights upon the negro and securing his unmolested enjoyment of them against the hostile legislation of certain Southern states. The first act led to the adoption of the Fourteenth Amendment to the Federal Constitution. In 1883 the U. S. Supreme Court declared the second act unconstitutional in so far as its operation in the various states was concerned, thus leaving it operative only in the territories and the District of Columbia.

**Civil Service.** The body of appointive public officials charged with conducting the civil administration. The civil service varies in importance in the different nations according to the form of government and according to the degree in which the functions of government have been extended. Thus in Germany, where the government is highly centralized and where the state has under its control such important functions as the op-

eration of the railways, the civil service is proportionately far more important than in England or the United States, where such functions are left to private enterprise. Nevertheless in all modern states the civil service has vastly increased in importance in the last century. In the United States the development of the post-office and the creation of such important branches of service as the Department of Agriculture, the Interstate Commerce Commission, and the Department of Commerce and Labor has resulted in a great increase in the federal civil service. Government workers under civil service reached a total of over 600,000 in 1934. The growth of cities, with the consequent development of municipal functions, such as the supplying of water and the construction and maintenance of streets and highways, has brought about a parallel increase in the municipal civil service. The state civil service, on the other hand, although increasing absolutely, tends constantly to decrease in relative importance.

The federal civil service is strongly centralized. With the insignificant exception of the employees of Congress, every person in the federal civil service owes his position directly or indirectly to the President. The heads of departments and numerous other important executive officials are appointed by the President, subject to confirmation by the Senate. The power of removal, however, is exercised by the President alone, and with the exception of the period from 1867 to 1887 Congress has not attempted to interfere with the President's power of removal. Under the administration of Washington civil service positions were generally filled by persons chosen for fitness. The prevailing view in the first decades after the adoption of the federal constitution was that civil service officials should hold office during good behavior. President Jefferson, while professing this view, nevertheless thought it expedient to remove a large number of the appointees of the previous administration. Whenever possible this was done under cover of alleged misconduct in office. By 1820, when an act was passed fixing at four years the term of office for a large class in the federal civil service, party leaders in the states had learned the advantages to be gained for their organizations through control of offices. When Jackson was elected President he inaugurated the policy of removing a large proportion of the civil service officials and replacing them by his own supporters. The precedent thus estab-

lished was followed by Jackson's successors to the great detriment of the service. In 1883 was passed the Civil Service Law which empowered the President to extend the merit system by executive order. Since that time the successive Presidents have extended the merit system to one class of civil servants after another. The classified service at present extends to over 120,000 positions. The most conspicuous examples of exemption from the civil service rules are the fourth-class postmasters.

Under the rules now in force examinations for the classified service are held at frequent intervals in the various centres of population. Any person possessing certain qualifications may present himself for examination. The papers are graded on a scale of 100, and every competitor who is graded above 70 is eligible to the office for which he competes. When a vacancy occurs, unless the office is filled through noncompetitive examination, through transfer, promotion, or reinstatement, the appointing officer requires the commission to certify to him the names of eligible candidates. The commission then certifies the names of the three at the head of the list. The appointing officer is free to select from the three, but in practice the one highest on the list receives the appointment in the great majority of cases. Similar customs of civil service appointment prevail in the many states where the merit system is in force.

There has been concern, especially in connection with Federal Civil Service, that the thousands of appointments made under the New Deal to relieve unemployment would weaken the Civil Service system which had been achieved only after years of constant effort. But President Roosevelt assures the nation that these appointments are only temporary and that he stands strongly for the extension of the rules of the Civil Service system.

**Civil War, American**, the war, 1861-5, between the Northern and Southern States of the U. S., or between the U. S. (proper) and the Confederate States of America. For its political significance see UNITED STATES; for the Confederacy see CONFEDERATE STATES OF AMERICA; also see SECESSION and STATE RIGHTS. On April 12, 1861, South Carolina opened the war by firing on Fort Sumter, which, after a bloodless conflict, surrendered two days later. The first serious engagement, a decisive Confederate victory, was fought at Bull Run (July 21, 1861)—the Federals being commanded by McDowell, the Confed-

erates by J. E. Johnston and Beauregard. Soon afterward McDowell was succeeded by McClellan, who rendered his greatest service, and one of the utmost value, in moulding the famous Army of the Potomac into a most efficient fighting force.

At the beginning of 1862 fighting on a large scale began in the West. Here two sets of operations were long coincidently in progress—one (also in the Southwest) for the control of the Mississippi, the other resulting from the efforts of the Federals to drive back and overcome the Confederate armies between the Alleghanies and the Mississippi. The first Confederate line of defence extended irregularly across Kentucky. Eastern Kentucky was freed from Confederate control by the battle of Mill Springs (Jan. 19, 1862), and the line itself was irrevocably broken by the Federal capture (by Grant and Admiral Foote) of the central strongholds, Forts Henry and Donelson (Feb. 6 and Feb. 16, 1862). A new line was then established by the Confederate commander, Gen. A. S. Johnston, approximately along the Memphis and Charleston Railroad—"the great central east and west artery of the Confederacy." Of this line Corinth constituted the center, Memphis the left and Chattanooga the right flank. Grant (under Halleck, then commanding in the West) aimed at Corinth, but at Shiloh (Pittsburg Landing) he was surprised by Gen. A. S. Johnston, who, however, in a 2-days' battle (April 6-7) was beaten back, Grant being assisted and possibly saved from defeat by the opportune arrival from Nashville of Gen. Buell. Gen. Johnston himself was killed, and was succeeded by Beauregard, who withdrew to Corinth. This place he soon (May 30) gave up to Halleck, who had taken command in person in the field. Memphis passed into Federal hands on June 6. Previously, by the capture of New Madrid (Mar. 14) and Island No. 10 (April 7), and through the enforced Confederate evacuation of Fort Pillow (June 5), the Federals had gained control of the Mississippi to this point, and now the river became free as far s. as Vicksburg. In April, also, Farragut had gained possession of New Orleans, and from its mouth to Port Hudson the Mississippi was also practically free. In July, Bragg (Confederate) strongly fortified Chattanooga, and in East Tenn. was confronted by Buell commanding the Army of the Ohio—Halleck having been transferred to Washington to direct all the Federal forces in the field and Grant having been placed at the head of the Army of the

Mississippi and the Army of the Tennessee. Bragg suddenly, late in August, eluding Buell for the moment marched for Louisville, Ky.; a race between the two followed; Buell, reaching Louisville first, turned on Bragg, and by the battle of Perryville (Oct. 8) forced him back into Tenn. In the closing months of 1862 and in Jan., 1863, occurred the first Federal campaign (unsuccessful) against Vicksburg, Grant proceeding by land and Sherman down the Mississippi from Memphis.

During all this period there had been heavy fighting in the East, where the great Federal objective was Richmond, the capital of the Confederacy. Early in March McClellan with the Army of the Potomac was transferred to the peninsula between the York and the James rivers, thence to move against Richmond, while McDowell at the head of another army was to coöperate by marching from before Washington toward the Confederate capital. Other Federal armies (under Banks and Frémont) were in the Shenandoah Valley. McClellan delayed to besiege Yorktown (which was evacuated May 3), then proceeded up the peninsula, defeating the Confederates at Williamsburg (May 5) and at Fair Oaks or Seven Pines (May 31-June 1), where the Confederate commander, J. E. Johnston, was wounded and was succeeded by Gen. Lee. Meanwhile 'Stonewall' Jackson (Confederate), in a brilliant campaign in the valley against Banks and Frémont, frightened the Federal government into holding back McDowell for the defence of Washington. Jackson then rejoined Lee. McClellan thus failed to receive the expected support of McDowell, and during the Seven Days' Battle (June 26-July 2), his campaign, already a failure, changed his base from the York to the James, fighting almost continuously with Lee. With Lee's futile attack on Malvern Hill (July 1) the Peninsula campaign virtually closed.

Lee, however, was soon confronted by a new antagonist. Gen. Pope (Federal) at the head of the Army of Virginia (a short-lived organization formed by the consolidation of the former commands of McDowell, Banks, Frémont) advanced to the Rappahannock. Jackson, passing through Thoroughfare Gap to Pope's rear, destroyed large quantities of Federal supplies; and Pope drew back to meet Jackson, whom Lee joined with his other corps (Longstreet's). The two armies met (Aug. 29) on the old battlefield of Bull Run, and Pope was defeated and driven back to

Washington. Lee then taking the offensive advanced into Maryland, but was met by McClellan (who had superseded Pope), and by the battle of Antietam (Sept. 16-17) was forced back across the Potomac. Soon afterward McClellan gave way to Burnside, who planned a flank movement by way of Fredericksburg against Richmond. Lee, however, anticipated him in seizing and fortifying the heights back of Fredericksburg. Lee's position was almost impregnable, but Burnside, with great foolhardiness, endeavored to dislodge him (Dec. 13) and was beaten back with terrible loss. Burnside, however, even contemplated making a second attack, but before he could do so was superseded by Gen. Hooker, who on May 1-4, 1863, was thoroughly defeated by Lee at Chancellorsville, near Fredericksburg. The Confederates, however, suffered an irreparable loss in the death of Jackson. For the second time Lee took the offensive, and advancing through the Shenandoah Valley, penetrated into Pennsylvania. He was followed by Hooker, who on June 28 gave way to Meade as the Federal commander, and by the terrible three days' battle of Gettysburg (July 1-3, 1863) was once more forced back into Virginia. From this reverse has been dated the beginning of the fall of the Confederacy; and until the close of the war there were no more Confederate invasions.

While these Eastern campaigns were in progress, hostilities were also being pushed with vigor in the West. In the autumn of 1862 Rosecrans (who had superseded Buell) lay with the Army of the Cumberland in Nashville, while Bragg occupied Chattanooga. In Nov., Bragg advanced to Murfreesboro; Rosecrans on his part proceeded toward Chattanooga, and along the Stone River near Murfreesboro the two armies met on Dec. 31, 1862, the battle being tactically drawn, though Bragg withdrew and left the field in the possession of the Federals. In the early part of 1863, also, Grant, again assisted by Sherman, once more moved against Vicksburg, and in a series of successful operations and by skillful manœuvring he finally shut the Confederate leader Pemberton within that stronghold. Two assaults having failed (May 19 and 22) he settled down to a siege; and on July 4, 1863, almost simultaneously with the Federal victory at Gettysburg, Pemberton with about 37,000 men surrendered. Banks had meanwhile been operating against Port Hudson, and on July 8, news of the fall of Vicksburg having reached the Confederate

garrison, this place also surrendered, and the Mississippi at last was free.

After a six-months' rest at Murfreesboro, Rosecrans late in June, 1863, once more took the offensive. By skilful manœuvring he compelled Bragg (strongly fortified at the outset at Shelbyville) to abandon position after position, and finally (early in Sept.) flanked the Confederates out of Chattanooga. Bragg remained nearby, however, and in the battle of Chickamauga (Sept. 19-20, 1863) utterly defeated Rosecrans, who late in Oct. relinquished his command of the Army of the Cumberland to Thomas. Grant, who had been placed in supreme command in the West, proceeded to Chattanooga, whither he also called Sherman, and in the battle of Chattanooga (Nov. 23-25, 1863) the Confederates in turn were badly defeated.

On Mar. 9, 1864, Gen. Grant was made a lieutenant-general and was placed in supreme command, under Pres. Lincoln, of all the Federal armies in the field. Sherman was left in command in the West, and after a campaign against the cautious and skilful Johnston and the rash and impetuous Hood (Johnston's successor), gained possession of Atlanta (Sept. 2, 1864). In Nov. Sherman cut loose from his communications and started on his famous 'March to the Sea,' while Hood, his antagonist, endeavored to crush Thomas and Schofield in Tenn. and in the battles of Franklin (Nov. 30) and Nashville (Dec. 15-16) was himself crushed by them. Sherman, destroying crops and doing great damage over a belt 60 m. wide as he marched, reached the vicinity of Savannah early in Dec. and gained possession of that place on Dec. 20. He then marched n. through the Carolinas, where once more he had Johnston for his opponent, and by the middle of April, 1865, had reached and occupied Raleigh, N. C.

Grant, after leaving Sherman in command in the West, himself assumed the personal direction of the operations against Lee in the East, and having a great preponderance of strength, adopted almost from the first the policy of 'hammering.' He first, early in May, confronted Lee in the Wilderness, a dense forest in the vicinity of Chancellorsville, and the first stubborn contest occurred on May 5-6, the advantage on the whole being with Lee. Between May 8 and May 21 there was almost continuous fighting in the vicinity of Spottsylvania Court House, the Federal loss exceeding that of the Confederates. Between May 31 and June 12 a series of bloody en-

gagements were fought in the vicinity of Cold Harbor, Grant's assault on June 3 being repulsed with relatively slight loss by Lee, though the Federal loss was appalling. Within five weeks Grant had lost almost as many men as Lee had had at the beginning of the campaign. Grant, changing his base to the James River, soon began his long contest to gain possession of Petersburg, a place of great strategic value. In July Lee sent Early through the Shenandoah Valley into Maryland. Washington itself was at one time in imminent danger of capture, but Early was delayed by Wallace at Monocacy, and soon withdrew to Strasburg. Into the Valley Grant then (Aug.) sent Sheridan, who beat back Early, and moreover thoroughly devastated that rich grain-producing region. Both Sheridan and Early were called to Petersburg. In March 1865, Grant renewed his 'hammering,' and after a brave and brilliant resistance, Lee, his army suffering greatly from lack of food and almost exhausted, surrendered (April 9, 1865) at Appomattox Court House. With his surrender the Confederacy almost immediately collapsed. On April 26 Johnston surrendered to Sherman on the same terms previously granted to Lee. On May 4 Gen. Richard Taylor, commanding the Confederate forces in Miss. and La., surrendered to the Federal General Canby, and on May 26 Gen. Kirby Smith surrendered the Confederate forces in Texas.

Throughout the war most efficient services were rendered by the Federal navy, the stringent and rigorous blockade having much to do, as already mentioned, in bringing about the economic exhaustion of the Confederacy. The most important events in the naval history of the war were the contest between the *Monitor* and the *Merrimac* or *Virginia* (Mar. 9, 1862); the capture (previously mentioned) of New Orleans by Farragut; Farragut's victory over the Confederate squadron in Mobile Bay (Aug. 5, 1864); the various attempts, uniformly repulsed, to capture the defences of Charleston Harbor; and the destruction off Cherbourg, France, of the *Alabama* (Confederate) by the *Kearsarge* (Federal) on June 19, 1864.

The most important original sources of information are the *War of the Rebellion, Official Records* (70 v., 1886-1900) and the *Records of the Union and Confederate Navies* (1893- ). Of secondary accounts the following may be mentioned: Woods and Edmonds, *The Civil War in the United States* (1905); and Ropes, *Story of the Civil War* [for 1861

and 1862] (2 v., 1899). Also see the volumes of memoirs and recollections by various Federal and Confederate leaders, and for a more complete bibliography see Larned, *Literature of American History* (1903).

**Clackmannanshire**, the smallest co. of Scotland, is bounded by Perthshire, by the Firth of Forth, and by Stirlingshire and Perthshire. The climate is moderately dry, and the soil is generally rich and arable, the higher grounds being partly pastoral. The manufactures include woolen goods, wool spinning, iron founding, brick and tile manufacture, ale brewing, whiskey distillation, and coal mining; p. 31,121.

**Clafin, Horace Brigham** (1811-1885), American merchant, who established one of the first great wholesale drygoods stores in New York City.

**Clafin, William** (1818-1905), American merchant. He served in the State House of Representatives and Senate, was lieutenant-governor of Massachusetts in 1866-9, and governor in 1869-71. He was twice elected to Congress, serving from 1877 to 1881.

**Clafin University**. A coeducational institution for the education of negroes at Orangeburg, South Carolina, established in 1870 largely through the aid of the Hon. Lee Clafin of Massachusetts. The university is under Methodist Episcopal control.

**Claiborne, William** (c. 1589-c. 1676), American colonist, born in Westmoreland, Eng. He was sent to Virginia by the London Company as a surveyor in 1621; in 1625 was made secretary of state for the colony. In 1631 he established a trading post on Kent Island (in the Chesapeake Bay), to which a number of settlers soon came; Maryland, however, asserted her ownership of this island (1634), and this gave rise to a long dispute between Md. and Va., Claiborne himself eventually recognizing the authority of the former. In 1652 he was one of the commissioners sent to reduce Maryland and Virginia to obedience to the Commonwealth.

**Claiborne, William Charles Cole** (1775-1817), American political leader, born in Sussex co., Va. He was a member of the first constitutional convention of Tenn., and succeeded Andrew Jackson as the representative of the state in the national House of Representatives, serving two terms (1797-1801). In 1802-4 he was governor of Mississippi Territory; in 1803 he was one of the commissioners appointed (with James Wilkinson) to receive the transfer to the U. S. of Louisiana; from 1804-12 he was governor of

the Territory of Orleans (the lower part of the Louisiana Purchase), and in 1812-16 was the first governor of the state of Louisiana. He was elected to the U. S. Senate in 1816, but died before taking his seat.

**Clairau, or Clairaut, Alexis Claude** (1713-65), French mathematician. In 1736 he measured in conjunction with Maupertius, an arc of the meridian in Lapland. With Euler and D'Alembert he formed a triumvirate that succeeded Newton. He computed the perihelion and approximate date of return of Halley's comet.

**Clairvaux**, vil., dep. Aube, France; celebrated for its Cistercian abbey, founded in 1115 by St. Bernard.

**Clairvoyance**, a term which in French denotes clearness of insight, but which in English has become applied to the faculty claimed by certain persons, who profess to see objects hidden from ordinary human vision, and to describe events far distant in space or time. See PSYCHICAL RESEARCH.

**Clam**, a name for almost any edible bivalve mollusk other than a scallop, mussel or oyster. In the eastern United States the clams of market are of two kinds: the hard or round clam (*Venus mercenaria*) and the soft clam (*Mya arenaria*). The former are known in New England by the Indian name 'quohog,' and are contained in heavy, somewhat triangular shells, from which the Indians made the best of their wampum beads; they live on sandy bottoms, where they move about half sunk in the sand, and are obtained by raking or dredging, as in the case of oysters. These clams occur plentifully from New Jersey northward as far as the middle of the Maine coast. The soft clam is the *Mya*—the species used on the American Atlantic coast being *M. arenaria*, while that of Europe is *M. truncata*. It has thin, elongated, white shells, and is found deeply buried in mud or sand near shore, thrusting up a long siphon to imbibe water and with it microscopic nutriment during high tide, and withdrawing during the ebb. This clam, therefore, is obtained by digging, and as it is numerous, and reproduces itself rapidly and safely, it remains abundant, especially when the grounds are given periodical seasons of resting. Both these clams have been transplanted to the Pacific coast, and grow abundantly in San Francisco Bay, while several other species of local edible bivalves are eaten along that coast. The largest bivalve mollusk known is the giant clam (*Tridacna*) of the South Pacific region, whose valves may measure 2 ft.

across and weigh 500 lbs. It is a native of the Pacific and neighboring seas, and is dreaded by trepang-divers—on the Australian Barrier Reef—the sudden closing of the valves sometimes imprisoning the diver's hand or foot. Other species occur in the Indian and Pacific Oceans.

**Clan** is one of the outstanding forms of organization of early (not primitive) society. The term has acquired a special significance and application to the Highland clans of Scotland. The Scottish state was always weak, and never succeeded as England had in subordinating the various local authorities and reducing them to the level of subjects; and it confined its efforts to the attempt to elevate the clan system into the feudal system. The clan received a special development among Celtic peoples among whom feudalism had but little hold. It differed from the feudal system in the absence of charters or written agreements. The Highlanders had no liking for charters; and custom, by which the relations of chief and clansmen were governed, had its own advantages as between men of the same blood. For it must be remembered that the clan is united by descent from a common ancestor and that authority was conferred on the chief by the directness and authenticity of his descent from the common ancestor.

**Clan-na-Gael**, the name assumed by a society of Irish-American Fenians, was founded about 1884, and had as its object home rule in Ireland, for which it worked ardently.

**Clap, Roger** (1609-91); American colonist, born in Salcomb, Devonshire, Eng. He emigrated to the Massachusetts Bay Colony in 1630, lived at Dorchester until 1686 and thereafter at Boston. He is remembered chiefly for his *Memoirs* (1731), republished in Young's *Chronicles of Massachusetts Bay* (1846). He had fourteen children, including Experience, Preserved, Wait, Waitstill, Hopestill, Desire, Unite, Supply, and Thanks.

**Clap, Thomas** (1703-67), American educator, was born at Scituate, Mass., and graduated (1722) at Harvard. He studied for the Congregational ministry and was pastor of the church at Windham, Conn., from 1726 until his acceptance of the rectorship (now styled the presidency) of Yale College in 1740. Mr. Clap effected many reforms in the management of the college and library, and obtained (1745) a more liberal charter from the Connecticut legislature. His term of office ended in 1766 owing to differences with

his associates in regard to the propaganda carried on by Edwards and Whitefield. He published, among other works, *An Introduction to the Study of Philosophy* (1743), *The Religious Constitution of Colleges, Especially of Yale College* (1754), and *Annals or History of Yale College* (1766).

**Claque**, a body of men hired to applaud in theatres. The leader of the *claque* attends the rehearsals, and afterward gives instructions to the claqueurs to applaud, laugh, and weep, as required. The *claque* is considered illegitimate outside of Paris.

**Clare**, maritime co., prov. Munster, Ireland. The coast is very irregular, bordered in great part by high, rocky cliffs. The surface is mountainous or hilly, and very diversified. Large numbers of cattle and sheep are reared, pasture lands occupying about one-half of the county. Large oyster-beds lie around Ballyvaghan Bay, in the n., and the salmon fisheries of the Shannon, Fergus, etc., are important; p. 104,064.

**Clare, St.** (1193-1253), and **Nuns of the Order of Clarisses or Poor Clares**. St. Clare was born at Assisi in Italy. She fled to St. Francis at the Portiuncula in 1212, and gave her fortune to the poor. Within a few years she founded monasteries at Perugia, Padua, Rome, Venice, Milan, and elsewhere, under the strictest Franciscan rule. St. Clare was canonized by Alexander iv. (1255), her festival being August 11. The care of poor girls is one of the chief occupations of the sisters. They are the female Franciscan order, and have been represented in the United States since 1875.

**Claremont**, (1) tn., Sullivan co., N. H.; (2) vil., Los Angeles co., Cal. It is the seat of Pomona College; p. 12,144.

**Clarendon, Edward Hyde, Earl of** (1609-74), English statesman and historian, born at Dinton, Wiltshire. He studied in the Middle Temple, and associated with the literary people of the day. Entering the Short Parliament (1640) as a member for Wootton Bassett, Wiltshire, he at first co-operated with the progressive party, but later became with Falkland the king's confidential adviser. Created Earl of Clarendon, also confirmed in the dignity of High Chancellor, he managed to offend all parties, being popular with neither Cavaliers nor Puritans. He was one of the proprietors who obtained a grant of the first Carolina Charter in 1663, the Cape Fear establishment receiving the name of 'Clarendon County' in his honor. His *History of the Rebellion in*



*England* (1702-4) is an apology for and vindication of Charles I., and makes no profession of impartiality; but the stately splendor of its style, and the skill displayed in depicting character and analyzing motives, give it high rank. The best edition is that published by the Clarendon Press (1888).

**Clarendon, George William Frederick, Villiers, Fourth Earl of** (1800-70), English statesman, born in London, and educated for the diplomatic service. Though a Whig, he supported Sir Robert Peel in the repeal of the Corn Laws. He became Foreign Minister in the Aberdeen cabinet (1853), and was thus responsible for the Crimean War. Again Foreign Minister in 1865, he held the same portfolio in Mr. Gladstone's administration from 1868 till his death. See Thornton's *Life of G. W. F. Villiers, Fourth Earl of Clarendon* (1881-2).

**Clarendon, Constitutions of**, were laws or enactments by which Henry II. and his nobles (1164) met those demands for papal supremacy implied in the exemption of the clergy from the law of the land. These laws secured for the crown a right of interference in the election of church dignitaries, and were the cause of the quarrel between Becket and Henry II.

**Claret**, a light-red wine produced in the French province of Gironde, also known as Bordeaux wine. Scattered through the province are many chateaux, each of which yields a wine of special characteristics, which depend on the vintages, and these in turn largely on soil, climate, and season. The California clarets rival some of the best French wines in color, body, flavor, aroma, and power of maturing well with age.

**Clarinet**, or **Clarionet**, a wood-wind single-reed instrument, said to have been invented at Nuremberg, in 1690, by Johann Christopher Denner. Owing to its great compass, richness, and variety of tone, the instrument ranks as one of the most important



*Clarinet.*

in the modern orchestra. As a solo instrument the clarinet also takes a high place. It consists of a cylindrical tube which ends in a bell at the lower part, and at the upper part terminates in a cone-shaped mouthpiece. The tube is furnished with holes and keys which give a fundamental scale or register. In or-

chestras, the clarinets are usually in A and B-, the C clarinet being now little used; there is also a tenor clarinet. (See **BASSET HORN**.) In military bands the clarinets most in use are those in B- and E-. A bass clarinet, usually in B-, but sounding an octave below the ordinary clarinet, is also used in orchestras and military bands.

**Clark, Alvan** (1808-87), American optician, established a factory at Cambridgeport, where he was the first person in the country to make achromatic lenses. He progressed in the preparation of telescope lenses from the 18-inch glass at Chicago (1860) to the 36-inch refractor made for the Lick Observatory.

**Clark, Alvan Graham** (1832-97), American optician and astronomer, son of the preceding. He worked at lens-making in his father's factory, completed the telescope for the Yerkes Observatory, with a 40-inch lens, then the largest in the world.

**Clark, Champ (James Beauchamp)** (1850-1921), American legislator and Speaker of the U. S. House of Representatives, was born in Anderson co., Ky. He was president of Marshall College, West Virginia, in 1873-4; in 1875 he removed to Missouri. He served as Democratic Representative in Congress in 1893-5 and 1897-1911. He was permanent chairman of the St. Louis Democratic National Convention (1904) and was elected Democratic (minority) Congressional floor leader in 1908. He was re-elected to the Sixty-second Congress (1911-13), and on April 4, 1911, succeeded Joseph G. Cannon as Speaker of the House of Representatives. In 1912 he was a leading candidate for the Democratic nomination for President but was defeated at the Baltimore convention by Woodrow Wilson.

**Clark, Clarence Don** (1851-1930), American legislator, was born in Sandy Creek, N. Y. He removed to Evanston, Wyo., in 1881; was Representative in Congress in 1889-93, and was elected U. S. Senator in 1895, 1899, 1905, and 1911.

**Clark, Edward** (1822-1902), American architect, was born in Philadelphia, Pa. He studied architecture under Thomas U. Walter and acted as Mr. Walter's assistant while the latter was architect of the National Capitol and other buildings at Washington from 1851 to 1865. From 1865 until his death he was architect of the Capitol, and superintended the construction of public buildings in the District of Columbia. He was a mem-

ber of the commissions that supervised the erection of the Washington Monument and Congressional Library.

**Clark, Francis Edward** (1841-1927), American clergyman. He became pastor of the Williston Congregational Church at Portland, Me., in 1876, where in 1881 he founded the Society of Christian Endeavor, which is now founded in every land the world around. Among his many books are *Our Journey Around the World* (1894); *Training the Church of the Future* (1902); *Christian Endeavor in All Lands* (1906); *Gospel in Latin Lands* (with Mrs. Clark, 1900).

**Clark, George Rogers** (1752-1818), American soldier, was born in Albemarle co., Va. He settled in Kentucky in 1776, was sent to the Virginia Assembly (1776); was instrumental in having the 'county of Kentucky' created, and in December, 1777, obtained Governor Patrick Henry's approval of a plan for the conquest of the British posts in the Northwest. He gained possession of Kaskaskia, Cahokia, and Vincennes, in the Illinois country, in the summer of 1778. Clark's conquest of the Northwest has justly been regarded as of the utmost importance in securing to the United States, by the treaty of 1783, possession of the vast territory between the Mississippi and the Alleghanies. Consult *English's Life*; *Thwaites' How George Rogers Clark Won the Northwest* (1903); *Butterfield's History of George Rogers Clark's Conquest of the Illinois* (1904).

**Clark, Henry James** (1826-73), American naturalist, studied botany under Asa Gray and zoology under Agassiz, assisted Agassiz in microscopical work and natural history (1856-63). From 1866, he was successively professor in the Agricultural College of Pennsylvania, University of Kentucky, and Massachusetts Agricultural College. His Lowell Institute lectures were published under the title *Mind in Nature*.

**Clark, John Bates** (1847-1938), American economist, born in Providence, R. I. Professor of political economy at Carleton College, Minn., at Smith and Amherst Colleges until his appointment to the chair of political economy at Columbia in 1895. He published *Capital and Its Earnings* (1888); *Control of Trusts* (1901); *Distribution of Wealth* (1901); *Essentials of Economic Theory* (1907).

**Clark, Jonas Gilman** (1815-1900), American philanthropist, who gave \$3,500,000

for the founding of Clark University (q.v.).

**Clark, Mark Wayne** (1896- ), Am. lieut.-gen., b. N. Y.; grad. West Point, 1917; served in World War I. In World War II, went on secret mission to Africa, Oct., 1942, and was second in command to Gen. Eisenhower on Af. front. In 1943 was made chief of the Fifth Am. Army, and in 1944, chief of the Allied forces in Italy.

**Clark, William** (1770-1838), famous Am. explorer, leader of the Lewis and Clark expedition, brother of George Rogers Clark; b. in Va. He led the expedition of 1804-6 from St. Louis to the mouth of the Columbia River; was gov. of Missouri Territory (1813-21); surveyor-general of Illinois, Missouri, and Arkansas (1824-5); Federal superintendent of Indian affairs (1822-33). Consult *Original Journals of Lewis and Clark Expedition*; *Thwaites' Life* (1906); *Wheeler's Trail of Lewis and Clark, 1804-1904* (1904).

**Clark, William Andrews** (1839-1925), American capitalist and U. S. Senator, born near Connellsville, Pa. He amassed a large fortune through his copper-mine holdings in Montana and Arizona, and also acquired immense plantations in California and Mexico. He was elected U. S. Senator from Montana for the term of 1901-07. With E. H. Harriman he built and paid for the San Pedro, Los Angeles and Salt Lake Railroad from Salt Lake City to the Pacific Coast (778 m.).

**Clark, William Bullock** (1860-1917), American geologist and educator. After 1887 he was a member of the faculty of Johns Hopkins University. He was commissioner on the re-survey of the Mason and Dixon line (1900), geologist (1894-1907) on the United States Geological Survey. He published *Geology of Maryland* (1906).

**Clark, William George** (1821-78), English man of letters, was born in Yorkshire. He established the *Journal of Philology* (1868). The *Cambridge Shakespeare* (1863-6) was planned by him as was the *Globe Shakespeare* (1864).

**Clark, Willis Gaylord** (1810-41), American poet and journalist, twin brother of L. G. Clark, entered journalism in Philadelphia, and owned and edited the *Gazette* of that city at the time of his death.

**Clark College.** See **Clark University**.

**Clarke, Sir Caspar Purdon** (1846-1911), Anglo-American art director of the Kensington Museum and in 1904 acted as Royal Commissioner to the St. Louis Exposition. In 1905 he was appointed director of the

Metropolitan Museum of Art, New York.

**Clarke, Frank Wigglesworth** (1847-1931), American chemist, professor of chemistry and physics at the University of Cincinnati from 1874 to 1883, when he was appointed chief chemist of the U. S. Geological Survey, U. S. National Museum. He was for eighteen years chairman of the International Committee on Atomic Weights. He published: *Weights, Measures and Money of All Nations* (1876); *Elements of Chemistry; Constants of Nature* (1873-82); *Recalculation of the Atomic Weights* (1897; 1910); *Elementary Chemistry* (1902).

**Clarke, Sir George Sydenham** (1848-1933), First Baron Sydenham of Combe, English soldier. He saw service in Egypt and the Sudan (1882-5), and became an expert in the science of fortification. He was governor of Victoria, Australia, 1901-1904, and of Bombay, 1907-1913.

**Clarke, James Freeman** (1810-88), American theologian and writer, in 1841 assisted in founding the Unitarian Church of Disciples in Boston, Mass., of which he was for many years pastor (1841-50; 1854-88). He was professor of natural theology in Harvard (1867-71), and an earnest anti-slavery advocate. Among his works are: *Orthodoxy* (1866); *Events and Epochs in Religious History* (1881). His *Autobiography* was edited by E. E. Hale.

**Clarke, James P.** (1854-1916), American legislator, practised in Helena, Ark. He was elected to the State legislature in 1886, was attorney-general (1892) and governor (1895-7), and served as U. S. Senator until his death.

**Clarke, John Hessin** (1857- ), American jurist and U. S. Supreme Court justice. From 1914 to 1916 he was U. S. district judge for the Northern Judicial District of Ohio. In July, 1916, he was appointed by President Wilson to succeed Charles Evans Hughes, resigned, as an Associate Justice of the U. S. Supreme Court. In 1922 he resigned this office to engage in other public work, notably the cause of international peace.

**Clarke, John Mason** (1857-1925), American geologist. He was professor of mineralogy and geology at Smith College (1881-4); assistant State palæontologist of New York (1886-94); assistant State geologist (1894-8); State palæontologist (1898-1904); and in 1904 became State geologist and palæontologist and director of the State Museum

and Science Department, University of the State of N. Y.

**Clarke, Thomas Shields** (1860-1920), American sculptor and painter, was born in Pittsburgh, Pa. He was graduated from Princeton University (1882), and studied art in New York, Paris, Rome, and Florence. Examples of his sculpture are the caryatides on the Appellate Court House, New York City, the *Alma Mater* for the Princeton University Campus, and the *Cider Press Monument* in Golden Gate Park, San Francisco. His best known paintings are *A Fool's Fool* (1887) and *The Night Market in Morocco* (1891).

**Clarke, William Horatio** (1840-1913), Boston organist and author. His publications include: *Valuable Organ Information* (1904); *Standard Organ Building* (1911).

**Clark Fork River** is formed in Western Montana by the confluence of the Flathead and Missoula Rivers, and joins the Columbia River just across the Canadian border. With the Missoula, its length is about 700 m.

**Clarks ville, town, Arkansas**, county seat of Johnson co. It is the seat of the College of the Ozarks; p. 3,118.

**Clarks ville, city, Tennessee**, county seat of Montgomery co. Here is located the Southwestern Presbyterian University. Clarks ville is one of the largest sales shipping markets for tobacco in the United States; p. 11,831.

**Clark University**, an institution of higher education for men and women, in Worcester, Mass., founded in 1889 by Jonas Gilman Clark. At first a graduate school only, later with an undergraduate department as well.

**Clark University**, a non-sectarian institution, South Atlanta, Ga., founded in 1870.

**Classical Studies, American School of**, at Athens, Greece, an institution devoted to the study of Greek languages, literature, and archæology. It is supported by contributions from American universities and colleges, from which its students are largely drawn.

**Classics.** This term, as applied to literature, is derived from the division of the ancient Roman people into five classes, on the basis of property in land. The term *classicus* was especially applied to the first. Aulus Gellius (second century A.D.) was the first to use the term 'classic' of the great writers of Greece and Rome; but from his time it was regularly employed to describe those authors. The classical period of Greek literature ex-

tends from the time of Homer; it ends about the time of the death of Alexander the Great, in 323 B.C. The term '*classic*' has always been held to connote perfection of literary form combined with excellence of matter. The term '*classics*' is now also used of the great authors of any language whose works fulfil the above-named conditions, such as Shakespeare, Milton, Dryden, of the English writers; Corneille, Racine, Molière among the French; Schiller and Goethe among the Germans; and Dante, Petrarch, Tasso, and Ariosto among the Italian writers.

**Classification**, an arrangement of a number of things into groups or classes, such that the members of any group resemble each other in one or more respects, while differing in the same respects from the members of the other groups.

**Clastic**, a term applied by geologists to materials which have been produced by the disintegration of rock masses. Sands, clays, and gravels are of clastic origin, and the rocks which they form are known as clastic rocks. The processes by which clastic sediments are produced are known as denudation.

**Claudel, Paul** (1868- ), French poet and diplomat. He served as secretary in Peking, was ambassador to Tokyo in 1921-1926, and in 1927 became ambassador to the United States. His published works include *Connaissance de l'est* (1900); *Poemes de guerre* (1915); *La messe la-bas* (1919); and *Feuilles de saints* (1926).

**Claude Lorrain, or De Lorain** (1600-82), French landscape painter, whose real name was CLAUDE GELÉE, was born in Chamagne in Lorraine. He was taken to Rome in 1613. He effected a great revolution in art by being the first to study the introduction of 'sunshine effects' in a natural manner. He had many patrons—Pope Urban VIII. and his three successors. England is rich in Claude's works.

**Claudius**, the name of a distinguished Roman clan. The most noteworthy members were: APPIUS CLAUDIUS REGILLIENSIS SABINUS, leader of the commission of ten which framed the Twelve Tables, the first Roman code of law. APPIUS CLAUDIUS CÆCUS, censor in 312, consul in 307 and 296 B.C. The story that he was blind is doubtful. In his censorship he built the Appian aqueduct and began the Appian Way. PUBLIUS CLAUDIUS PULCHER, usually known as Clodius, tribune of the people in 58 B.C., was the persistent enemy of Cicero, whose banishment he se-

cured. Evidence had disproved a plea of *alibi* brought forward by him when tried on the charge of profaning the mysteries of the Bona Dea in 62. In revenge he secured Cicero's banishment in 56. For some years after that he was prominent in causing disturbances at Rome; he and his chief enemy Milo were regularly attended by armed bands of gladiators. At last, in January, 52, he met his death in an affray between his followers and Milo's near Bovillæ, on the Appian Way.

**Claudius** (10 B.C. to 54 A.D.), Roman emperor from 41 to 54 A.D. whose full name was TIBERIUS CLAUDIUS DRUSUS NERO GERMANICUS, was the younger son of Drusus, brother of the Emperor Tiberius. The chief event of his reign is the conquest of Britain in 43.

**Claudius II.** (214-270), emperor of Rome (268 to 270 A.D.), whose full name was MARCUS AURELIUS CLAUDIUS GOTHICUS, is believed to have been one of the conspirators who murdered Gallienus, and whom he succeeded. His short reign was distinguished by two great victories—the first over the Alemanni, who had invaded Italy; the second over a huge host of Goths, who were besieging Thessalonica, in a battle near Næsus in Dardania (269 A.D.). He died in Sirmium in 270.

**Claudius, Matthias** (1740-1815), German author. His works show his kindly humor; his language was suited to simple folk, among whom the *Bote* rapidly became popular. There is a selection of his works in English, *Claudius, or the Messenger of Wandsbeck*.

**Claus, Emile** (1849-1924), Flemish painter, was born in Vive Saint-Eloi. His love of open air painting brought him into conflict with traditional teaching. He became popular as a painter of children. His talent shows itself in *The Old Gardener* (Liege) and the *Flax Weeder* (Antwerp).

**Clausen, George** (1852), realist painter, devotes himself to painting impressions of rural life and study of sunlight direct from nature. In 1886 he joined Holman Hunt and Walter Crane in their crusade against the Royal Academy, and was one of the founders of the New English Art Club. Among his pictures are the *Girl at the Gate*, *The Ploughman's Breakfast*, *The Listener*, and *A Morning in June*.

**Clavichord**, a medieval musical instrument, the forerunner of the pianoforte since its strings were set in vibration by a keyboard instead of being plucked by strings, as in the earlier instruments of the harp type. See PIANO.

**Clavicle**, or **Collar-bone**, a long bone, lying almost horizontally between the upper end of the sternum or breast-bone and the acromion process of the shoulder-blade. It lies above, and partially in front of, the first rib, and its special function is to act as a fulcrum to the upper extremity, making lateral motion of the arm possible.

**Clavicornia** ('club-horned'), a name given by entomologists to a series of beetles having club-shaped antennæ. The group includes the burying-beetles.

**Clavier**, the name given to a pianoforte by the Germans, and to the keyboard of a piano or organ by the French.

where, when the animal wishes to seize its prey it pulls down the bone and claw by contracting a muscular tendon which runs underneath the toe. Such claws are said to be 'retractile.' The kangaroo or great ant-bear can rip open a dog with one stroke of the greatly developed fourth toe, which carries a powerful claw. Claws are always present on the toes of birds. By analogy, the term 'claw' is also applied to similar types of weapon in the invertebrates—the claws of crustaceans, of insects and so on. In these cases the claw is the actual extremity of the limb.

**Claxton, Philander Priestly** (1862- ),



Painting by Claude Lorrain: *David at the Caves of Abdullah*, Metropolitan Museum, New York City.

**Clavigero, Francisco Xavier** (1731-87), Spanish-Mexican historian; devoted his life to the collection of material for a history of Mexico. It was translated into English, under the title of *The History of Mexico*, by Cullen (1787). Clavigero likewise wrote *Storia della California*, published in Venice (1789).

**Claws.** In the majority of mammals the digits end in more or less sharp and pointed nails called claws or talons, often constituting powerful weapons. In ungulates these are replaced by the hoofs, and in most primates by flattened nails. As weapons, claws are most perfectly developed in the Carnivora, especially in the higher forms—the cat,

born in Bedford co., Tenn., graduated from Johns Hopkins University, studied education in Germany. He taught in schools and colleges until in 1911 he was appointed U. S. Commissioner of Education, an office he held until he became provost of the University of Alabama, 1921-1923. He was superintendent of schools, Tulsa, Oklahoma, 1923-1929. He has edited educational magazines as well as writing and lecturing on education.

**Clay**, a mineral occurring in the form of a fine earthy powder, very rarely in definite plates or crystals, and consisting essentially of hydros silicate of alumina. It is insoluble in acids, but dissolves slowly in boiling caustic alkalis. Kaolin is the result of the de-

composition of feldspar in granitic rocks under the action of the atmosphere and other agencies. China clay is the purest form. This mineral is the basis of an immense industry including the manufacture of brick, terra cotta, stoneware, pottery, china, and many related wares. The product exceeds \$100,000,000 each year in U. S.

**Clay, Cassius Marcellus** (1810-1903), American political leader and abolitionist, born in Madison co., Ky. He established, 1845, at Lexington, Ky., an anti-slavery journal, the *True American*, which, however, he was soon forced by mob violence to remove to Cincinnati, O. He was an anti-slavery candidate for governor of Ky. in 1850, and after 1856 was a prominent member of the newly organized Republican Party. He was U. S. minister to Russia (1861-2 and 1863-9). Consult his autobiography, *The Life, Memoirs, Writings, and Speeches of Cassius M. Clay* (1886).

**Clay, Frederick** (1839-89), English operatic composer. He wrote many songs, among which are *She wandered down the Mountain Side*, *I'll Sing Thee Songs of Arabia*, and *The Sands of Dee*.

**Clay, Henry** (1777-1852), American orator and statesman, born in Hanover co., Va., the son of a Baptist clergyman, who died in 1781. Henry received little schooling, owing to the necessity of his contributing to the support of the family. He was admitted to the bar in 1797, and in practice at Lexington, Ky., met with immediate success, one of his cases being the defence of Aaron Burr in 1807. He was a member of the Ky. Constitutional Convention of 1799, in which he vigorously but without avail advocated the prohibition of slavery within the state; he served in the Kentucky legislature and in the U. S. Senate, in which he began his long fight in behalf of internal improvements. He was the leader of the group of younger members, including Calhoun and Lowndes, who urged the adoption of an aggressive policy toward Great Britain, and the declaration of war in 1812 was probably due more to his influence than to that of any other one man. In 1814 he was one of the negotiators of the Treaty of Ghent, bringing the War of 1812 to a close.

Clay's term as secretary of state (1825-9) was marked principally by the bitter controversy concerning the Panama Congress which he strongly favored. He subsequently was a member of the U. S. Senate from 1831 to 1842 and from 1849 until his death, at

Washington, on June 29, 1852. After 1824 Clay's career was characterized by an almost unremitting struggle for the presidency, which he eagerly coveted. Clay is remembered, however for his extremely important services in Congress. These were connected primarily with two subjects—protection and the great slavery contest. From the beginning he favored protection. As regards slavery he took a middle ground, pleasing neither side. His position between the two extremes, however, enabled him to play a part as mediator, which was peculiarly congenial to his temperament and to which he was impelled primarily by his passionate love for the Union. In this rôle, indeed, he was so conspicuous that he has become known as 'The Great Pacificator.' He favored, but did not originate, as is often said, the Missouri Compromise of 1820.

With Webster and Calhoun, Clay formed the great triumvirate of what has been called 'the golden age of American oratory.' Consult Colton (ed.), *The Works of Henry Clay* and Schurz, *Henry Clay* (1887), in the American Statesmen Series.

**Clay Ironstone** is a variety of spathic or carbonate iron ore. It is of various shades of gray or brown, and, when exposed to the atmosphere, weathers on its surface to a red, rusty-looking substance. Sometimes it contains a considerable amount of admixed coal, and as it is then black in color it is known as blackband ironstone. The blackband ores have been of great economic importance in Pennsylvania and other states of the Appalachian region.

**Claymore**, the two-edged broadsword of the ancient Scottish Highlanders.

**Clay Pigeon**. See **Pigeon Shooting**.

**Clay-rock**, a rock consisting of clay, and occurring in beds from a few inches up to several feet in thickness.

**Clays, Paul Jean** (1819-1900), Belgian marine painter, born at Bruges; associated himself with the group of artists who practically established the modern Belgian school of art. His strength is especially shown in depicting the beauties of the sea. His best-known pictures include *Dutch Boats in the Flushing Roads* (National Gallery, London), *Festival of the Scheldt at Antwerp* (New York), *Calm on the Scheldt and Coast near Ostend* (Brussels), *The Open North Sea* (Munich).

**Clay Soils**. Clay is a very important ingredient of agricultural soils in which it is always mixed with other minerals, its propor-

tion varying within wide limits. Clay soils are moist, and retain their interstitial water when exposed to drought. But clay, when wet, is impermeable to water; hence clay soils are improved by systematic and thorough drainage. Clays are also adhesive, and hard to till, and in consequence they are said to be 'heavy.'

**Claystone**, a name often given by the older geologists to a fine-grained, soft, pale-colored, frequently pink or yellow rock, formed by the weathering of certain igneous rocks.

**Clayton, Henry Helm** (1861- ), American meteorologist, has studied weather conditions by sending kites and balloons into the upper air, and been prominent in weather forecasting. See *World Weather Records* (1927).

**Clayton, John Middleton** (1796-1856), American jurist and political leader, born in Sussex co., Del. He was a member of the state legislature, and in 1837-9 was chief justice of the state. From Mar., 1849, until July, 1850, he was secretary of state in the cabinet of Pres. Taylor, and as such negotiated the Clayton-Bulwer Treaty with the British minister, Sir Henry Lytton Bulwer.

**Clayton-Bulwer Treaty**, a treaty between the U. S. and Great Britain, negotiated in 1850 by Secretary of State John M. Clayton, representing the U. S., and Sir Henry Lytton Bulwer, the British minister at Washington, representing Great Britain, July 4, 1850. Great Britain having established a protectorate over the Mosquito Coast in Nicaragua, this treaty was negotiated for the purpose of 'setting forth and fixing' the 'views and intentions' of the two powers with reference to the construction of a ship-canal across Nicaragua, the two powers declaring that neither would 'ever obtain or maintain for itself any exclusive control over the said ship-canal,' and agreeing to cooperate in protecting the canal when completed. The treaty subsequently gave much dissatisfaction in the U. S., was the subject of prolonged negotiations between the two powers, and was finally superseded by the Hay-Pauncefote Treaty of 1902.

**Cleanthes** (c. 300-220 B.C.), one of the leading Stoic philosophers of ancient Greece, chief of the Stoic school in 263 B.C.

**Clearchus**, a Spartan, who attached himself to Cyrus the younger, who was preparing to attack his brother Artaxerxes, and raised a large force of Greek mercenaries to

support him. In command of these he marched into Upper Asia in 401 B.C., and aided Cyrus in the battle of Cunaxa, in which Cyrus himself fell. It was this Greek force which formed the Ten Thousand, whose retreat through Asia is told in Xenophon's *Anabasis*.

**Clearing House**. In the ordinary course of business a modern city bank daily receives checks drawn upon other banks; checks drawn upon it are deposited with other banks. To obviate the inconvenience and risk that would attend the direct settlement of reciprocal claims, the banks in most important cities of America and Europe have formed associations which provide a common meeting place, called a clearing house, where clerks are sent daily from each bank to present claims upon other banks in the association, and to settle claims upon it presented by such banks. The principle of settlement is simple: Each bank sends to the clearing house all checks drawn upon other banks; these are assorted, and a list is made showing what sum the bank claims from every other. The aggregate of claims represents the credits of the bank in the day's clearing house transactions. The bank then receives from the other banks lists of claims upon it, the aggregate representing the debits of the banks. After due examination by representatives of each bank of the separate items in the claims upon it presented, the credits and debits are balanced. In case the debits of a bank exceed its credits, it is required to pay the balance to the manager of the clearing house, who in turn pays the creditor banks the balances due them. By this method an enormous volume of claims is settled with very little shipping of actual money from bank to bank. See BANK.

**Clear Lake**, a lake in the n.w. part of California, much visited by tourists because of the scenic beauty of the region.

**Clearwing**, a moth of the Sesiidae, a family of moths remarkable for translucent wings.

**Cleavage** is the property possessed by certain minerals and rocks of splitting readily in certain directions, and yielding in consequence thin plates or fragments which have a smooth surface. The cleavage of crystals is quite distinct from that of rocks, and the two must not be confounded as the resemblance between them is only superficial. Cleavage in minerals depends on the regular disposition or arrangement of the molecules of which a crystal is built up. It is as nat-

tural a property of mineral as its color. mica has a very perfect cleavage, and can readily be split into thin plates which have a smooth and glancing surface. A slate can be split into thin slabs. When the beds are of uniform composition and the cleavage very facile, large thin slabs may be obtained, as in the slates of Vermont, but in most cases the cleavage is rude, and the fragments more or less irregular in shape.

**Cleveland, Moses** (1754-1806), American settler, was born in Canterbury, Conn., and graduated (1777) at Yale. In 1796, as a shareholder in the Connecticut land company, purchasers of Connecticut's share of the Western Reserve, he was appointed to supervise the survey of the allotted tract and to negotiate with the Indians. His expedition sailed by way of the Great Lakes. After negotiations with the Indians Cleveland decided (July 22, 1796) upon a site for a city on the shore of Lake Erie at the mouth of the Cuyahoga R., the party naming the new town Cleveland in their leader's honor. The spelling 'Cleveland' was adopted in 1830.

**Cleveland, Parker** (1780-1858), American mineralogist. He was appointed (1805) professor of mathematics and natural history at Harvard, and lecturer on chemistry and mineralogy in Bowdoin College. He made extensive studies of the mineralogy of the White Mountains, and his *Mineralogy and Geology* (1816 and 1856) established his reputation as the pioneer mineralogist of the country.

**Cleburne, Patrick Ronayne** (1828-64), an Irish-American soldier, born near Cork, Ireland. At the outbreak of the Civil War, he entered the Confederate service. He took a conspicuous part, as commander of a brigade, in the battles of Shiloh and Perryville, and, as commander of a division, in the battles of Stone River, Chickamauga, and Chattanooga. He participated in the Atlanta campaign against Gen. Sherman.

**Cleeve Cloud.** See **Cotswold Hills.**

**Clef**, in music, a sign placed at the beginning of a staff to indicate the pitch and name of notes. There are now only three clefs in use—the treble or G clef; the bass or F clef; and the C clef. The G clef consists of the five highest lines, the F clef of the five lowest lines, of the great staff. (See **MUSIC**.) The C clef is now used only for alto and tenor staves (formerly it was also used for others), and has two positions on the great staff; but the line on which the sign is placed is always the sixth line of the great staff—i.e. middle C.

**Cleft Palate**, a congenital condition due to incomplete development of the roof of the mouth. Cleft palate may be of any degree, from a splitting of the uvula to a cleavage (or, more accurately, a non-junction), which separates the two halves of the soft and hard palate from each other, and the premaxilla on one or both sides from the maxillary bones. It is often associated with hare-lip. Its tendency is to interfere with deglutition, taste, smell, hearing, and speech. See **PALATE**.

**Clematis**, a genus of plants, of the order Ranunculaceæ, embracing many species, mostly with a trailing habit, widely disseminated throughout the world. The flowers are apetalous, and have four colored sepals, with a profusion of anthers and pistils. The leaves are often three-parted, and raise the climbing species over bushes and walls by their twisting petioles, or by tendrils. Clematis hybridizes readily, and a large number of varieties have been produced. *C. viticella*, a leading garden type, climbs to a height of 8 to 12 ft. *C. lanuginosa* climbs to 5 or 6 ft., and bears large lilac-colored, star-shaped blossoms, from June to September. It is one of the parents of the popular *C. Jackmani*. *C. viorna*, sometimes known as the leather flower, has solitary blossoms with four drooping, thick purple petals. Like the beautiful *C. crispa*, it is found in the southern half of the United States. The most common fall-blooming species in American gardens is *C. paniculata*, with axillary and terminal panicles of dull white blooms. Another important native variety is *C. virginiana*, or virgin's bower.

Other species are the bright blue *C. alpina*; the evergreen or everbronze *C. calycina*; *C. montana*, which bears white flowers in May; the nearly evergreen *C. flammula*; the fragrant purple-flowered *C. aromatica*; *C. vitalba*, known as traveler's joy in Great Britain; and the yellow Indian virgin's bower, *C. orientalis*, which blooms in autumn. In general, it may be said that clematis likes deeply dug, rich soil, a certain amount of shelter, plenty of light and air, and some support upon which to climb.

**Clemenceau, George Benjamin Eugène** (1841-1929), French statesman, educated as a physician. He went to the United States in 1865, and settled in New York City, where he began the practice of medicine. Failing in this venture, he turned to teaching, in which he engaged until 1870, when he returned to France. He was mayor of

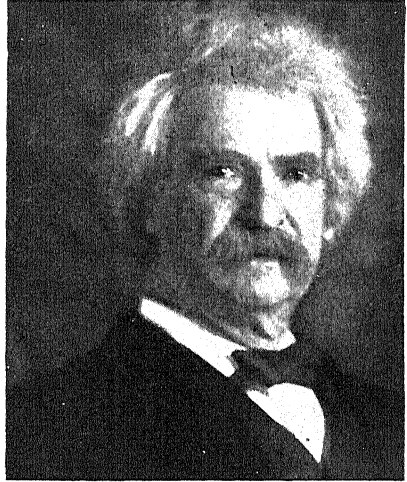


Montmartre during the Franco-Prussian War and in 1876 entered the Chamber of Deputies, in which he became leader of the Radical Party (Extreme Left). He was radically Republican, and from the outset of his career was known for his eloquence and independence of action. From 1883 to 1893 Clemenceau was looked upon as the maker of ministries in France. In 1903 he founded the daily *L'Aurore* in which he published a series of brilliant articles defending Captain Dreyfus (see DREYFUS AFFAIR). The famous *J'accuse*, by Zola, also appeared in this journal, which Clemenceau continued to edit until 1907. In 1906, Clemenceau became Prime Minister. In 1912 he brought about the overthrow of the Caillaux ministry, and in 1913 he wrecked the Briand cabinet. Upon the outbreak of the Great War (1914-18) Clemenceau was for a time Chairman of the Parliamentary Committee on the Army. On Nov. 17, 1917, he became Prime Minister for the second time in his eventful career, with a program in which the prosecution of the war was first and foremost. After the armistice he headed the French delegation at the Peace Conference of Versailles and ardently defended all the claims of France, his one interest being the security and well being of his country. In 1920 he resigned as premier and retired to private life. He visited the United States unofficially in 1922.

**Clemens, Samuel Langhorne**, universally known by the pseudonym MARK TWAIN (1835-1910), American author and humorist, was born in Florida, Mo. His father, John Marshall Clemens, removed to Hannibal, Mo., and Samuel received his education in the common schools of that place. Upon his father's death, the son became an apprentice in the office of the *Missouri Courier*, at the age of eleven. Later he was in the East, working on the *Philadelphia Inquirer*, and visiting New York and Washington. He returned to Hannibal in 1854, and in 1857 began his experiences as a river pilot, described in *Life on the Mississippi* (1883). It was during his life as a reporter in Nevada that he adopted the pen name taken from the call of the 'leadsmen' on the Mississippi steamers — 'Mark Twain' (mark two fathoms). He next moved to San Francisco (1864), where he wrote weekly articles in which the *Jumping Frog* and other sketches first appeared.

In 1867 Mark Twain's first book, *The Celebrated Jumping Frog of Calaveras County, and Other Sketches*, was published, and in the same year he was sent by the

*Alta California* as a passenger on the steamer *Quaker City*, chartered by a pleasure party for a trip to the Mediterranean and the Holy Land. Letters to the paper describing this trip were an immediate success; and on their publication in book form as *The Innocents Abroad* (1869) the writer found himself famous.



Samuel L. Clemens (Mark Twain).

In 1871 he removed to Hartford, Conn., where he resided for many years. He published *Roughing It* in 1872, and *The Gilded Age*, in collaboration with Charles Dudley Warner, in 1873. These works were followed by *Adventures of Tom Sawyer* (1876), *A Tramp Abroad* (1880), *The Prince and the Pauper*, published in England, Canada, Germany, and America (1881), *The Stolen White Elephant* (1882), and *Life on the Mississippi* (1883).

In 1907 he visited England, where he was received with honors and was given a degree by Oxford University. In addition to works already mentioned, his publications include *Adventures of Huckleberry Finn* (1884); *A Connecticut Yankee at King Arthur's Court* (1889); *Tom Sawyer Abroad* (1894); *Following the Equator* (1897), called in England *More Tramps Abroad*; *The Man that Corrupted Hadleyburg* (1900); *How to Tell a Story* (1904); *Captain Stormfield's Visit to Heaven* (1908).

Consult William Dean Howells' *My Mark Twain* (1910); Albert Bigelow Paine's *Mark Twain* (1912); *Mark Twain's Letters* (2

vols. 1917); De Voto's *Mark Twain's America* (1932).

**Clement**, the name of fourteen Popes of the Roman Catholic Church, beginning with Clemens Romanus, or CLEMENT OF ROME, and of three schismatical Popes.

**Clement of Alexandria**, Titus Flavius Clemens, one of the church fathers, the teacher of Origen. Of heathen parentage, he grew up with a remarkable thirst for truth. Platonism and Stoicism attracted him for a time, but, coming into touch with the Christian teaching of Pantænus at Alexandria, he was arrested by the ethical and religious depth, but especially by the speculative affinities, of Christianity. He became a teacher in the renowned catechetical school, eventually succeeded Pantænus (c. 200 A.D.), and died c. 220 A.D.

**Clement of Rome**, an early Christian writer, whom tradition asserts to have been bishop of Rome. The *First Epistle of Clement* (to the Corinthians) is one of the most valuable productions of the sub-apostolic age, particularly in virtue of the glimpses it gives of the church organization and the theological conceptions of the time. See Lightfoot's *The Apostolic Fathers: St. Clement of Rome* (1890).

**Clementi, Muzio** (1752-1832), Italian pianist and composer. He held the post of conductor at the Royal Italian Opera (1776-80). After a professional tour on the Continent, during which he had his famous piano contest with Mozart, he returned to England, and embarked in business as a musical instrument maker. See Ferris's *Great Violinists and Pianists* (1894).

**Clemson Agricultural College**, a non-sectarian institution at Clemson College, South Carolina, founded in 1889 and opened in 1893. It occupies the former home of John C. Calhoun.

**Cleobulus**, of Lindus, in Rhodes (c. 580 B.C.), one of the Seven Wise Men of Greece. Many of his sayings are preserved by Dio-genæ Laertius.

**Cleomedes**, the astronomer, published about the 2d cent. A.D., a Greek treatise, *On the Circular Theory of the Heavenly Bodies*, containing such truths as the earth's sphericity and the moon's revolutions (published Venice, 1498; Leipzig, 1832 and 1891).

**Cleomenes**, a name borne by three kings of Sparta, of whom two are of some note. CLEOMENES I. (reigned 520-491 B.C.) is remarkable for having attempted to restore the power of the Spartan royalty, which had

been curtailed by the institution of the ephorate. CLEOMENES III. (reigned 236-222 B.C.), restored the ancient Spartan constitution of Lycurgus.

**Cleon**, a leader of the extreme democratic party at Athens, after the death of Pericles, in 429 B.C., became one of the leading statesmen. In 425 his influence caused the rejection of the Spartan peace proposals, due to the shutting up of a force of Spartans in Sphacteria; and in the same year Cleon himself overpowered this force, and brought most of them prisoners to Athens. In 422 he commanded the Athenian forces against Brasidas, in Thrace, and lost the battle of Amphipolis, himself falling in the fight. Cleon is generally regarded as a demagogue. This view, however, must be received with caution as our chief authorities for his actions were his enemies.

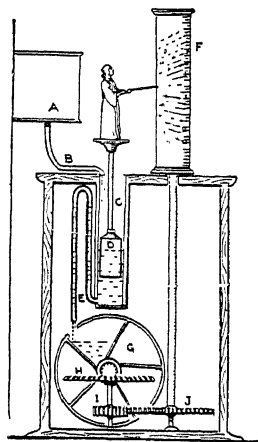


*The Obelisk, 'Cleopatra's Needle,'  
Central Park, New York City.*

**Cleopatra** (68-30 B.C.), third and eldest surviving daughter of Ptolemy Auletes, king of Egypt, who on his death (51 B.C.) associated with her brother Ptolemy in the royal power. He or his advisers expelled her from the throne, and she was endeavoring to regain power when Julius Cæsar arrived in Alexandria (48 B.C.). She soon won his affection and support. Ptolemy having perished in the ensuing war, Cæsar made her queen of Egypt with her younger brother.

Having borne a son, Cæsarion, to Cæsar (47), she followed the conqueror to Rome (46 or 45), and was apparently there at the time of his death. Returning to Egypt, she assisted the triumvirs, Augustus, Antony, and Lepidus; and over Antony she soon secured the same ascendancy she had enjoyed over Cæsar (41). Their association and ambition led to war between Antony and Augustus, decided by the battle of Actium (31), Cleopatra's flight with her ships contributing largely to the defeat. When Augustus next year landed in Egypt, she negotiated with him, being ready to betray Antony. She spread a false report of her death, whereupon Antony stabbed himself, and was brought to die in her arms. As she failed to fascinate Augustus, and saw he meant to carry her captive to Rome, she killed herself by the bite of an asp. See Stahr's *Cleopatra* (1879); Shakespeare's *Antony and Cleopatra*.

**Cleopatra's Needles**, the inaccurate designation of two obelisks of red syenite brought from Heliopolis (B.C. 14) to Alexandria, where they remained until they were presented by Ismail Pasha—the one to Great Britain, and the other to the United States. The British was erected on the Thames Embankment; the American obelisk now stands in Central Park, New York, opposite the Metropolitan Museum of Art.



*Clepsydra Ascribed to the Ancient Egyptians.*

**Clepsydra**, a water-clock, constructed to raise a float gradually by means of water dropping from above through a small hole. The float as it rose indicated the hour by a

scale of numbers marked at the side of the vessel; or, by a more elaborate arrangement, turned a hand on a dial by means of a pulley or ratchet wheel. Both in Egypt and Babylonia the ancient astronomers used the clepsydra to measure intervals of time.

**Clergy**, a name given loosely to all ministers of the Christian religion, in contrast to the laity. In the Roman Catholic and Greek Churches, the *secular* clergy are the ordinary priests, bishops, etc., while the monks and abbots who live according to any rule or order are known as the *regular* clergy. See BENEFIT OF CLERGY; ORDERS, HOLY; BISHOP; PRIEST; RECTOR.

**Clergy, Benefit of.** See **Benefit of Clergy**.

**Clergyman's Sore Throat.** See **Sore Throat**.

**Clergy Reserves.** When the provinces of Upper and Lower Canada were formed by the Act of 1791, the British government set aside one-eighth of all the crown lands of the two provinces for the support of the Protestant clergy. At length the Canadian parliament secularized these grants and applied them to other purposes, mainly educational (1854).

**Clericis Laicos**, the opening words of a bull promulgated by Boniface VIII. in 1296, which visited with excommunication every prelate, clerk, or monk who should pay, or promise to pay, to the laity any tax or any portion of his income or possessions, on any pretext, without the permission of the holy see. The bull was provoked by the action of Philip IV. of France in subjecting the French clergy to taxation.

**Clerk** (Latin *clericus*), originally a man in a religious order, a cleric, a clergyman; before the Reformation, and in the Roman Catholic Church, a member of any of the eight orders, sometimes excluding the bishop. Loosely used, it meant one who was able to write. At the present time the term clerk is used of an officer attached to synods, courts, and corporations; who keeps the records; a lawyer's assistant; a booking or a railway clerk; a bookkeeper and in the United States, a salesman or assistant in the shop or store.

**Clerk, Parish**, an official in the Church of England who used to lead the responses in a congregation, and who assists in the services of public worship, at funerals, etc. At present many of the duties formerly devolving upon the parish clerk are discharged by the sexton.

**Clerk, Synod**, a Scottish Church official who takes the minutes at synods, keeps the records, and does other work in connection with a diocese or presbytery. In the Episcopal Church, where there is a cathedral, the synod clerk is always one of the canons.

**Clerke, Agnes Mary** (1842-1907), British writer on astronomy, was born in Ireland. She made extensive astronomical observations at the Cape of Good Hope (1888) and also on board the yacht *Palatine* in a voyage to Copenhagen, Stockholm, and St. Petersburg (1890). Her published works include *The System of the Stars* (1890); *Modern Cosmogonies* (1906). In 1893 she received the Actonian Prize for her work in astronomy.

**Clerkenwell** parish, London, England. The original village sprang up round the Priory of St. John of Jerusalem, founded by Jordan Briset about 1100, of which the gatehouse yet remains. It takes its name from its holy well, where the parish clerks of London formerly congregated once a year to perform miracle plays; p. 57, 166. See LONDON.

**Clerk-Maxwell.** See Maxwell.

**Clerk of Parliaments**, the designation of the chief permanent official of the British House of Lords.

**Clermont**, the steamboat designed by Robert Fulton and launched on the Hudson River in September, 1807. She made the trip from New York to Albany, about 150 m., in 32 hours. She was the first steam vessel that was kept in continued commercial service.

**Clermont**, town, France. Its castle, dating from the 10th century, is now used as a prison for women. The English sacked Clermont in 1359 and 1415.

**Clermont-Ferrand** (ancient **Augustonemetum**), city, France, stands at the foot of the extinct volcano, Puy-de-Dôme, overlooking the Limagne. Important buildings are the Cathedral (1248-1346), built of lava from the surrounding district, and finished in the nineteenth century; Notre Dame Church, where the first crusade was preached by Peter the Hermit, in 1096. The bishopric of Clermont was founded in 253; and seven ecclesiastical councils were held here during the Middle Ages, the most remarkable of which was that in 1095, at which the First Crusade was instituted by Urban II. Gregory of Tours (c. 538) and Pascal (1623) were natives; p. 65, 386.

**Clermont-Ganneau, Charles Simon** (1846-1923), French Orientalist, was born in Paris. Besides exposing Shapira's forged MSS. and the modern botching of the tiara of

Saitapharnes, he conducted archæological investigations in the Orient (1874-5), and discovered the *stèle* of Mesha (1870). His published works include: *Études d'Archéologie Orientale* (1880-96); *Les Fraudes Archéologiques en Palestine* (1885); *Archæological Researches in Palestine* (Eng. trans. 1896).

**Clérودendron**, a genus of verbenaceous stove and greenhouse plants, some of which are climbers, while others are of shrubby habit. The most brilliant and best known of the climbing kinds is *C. Thompsonæ*, which is evergreen, and bears forked panicles of beautiful white-and-red flowers. Of the shrubby species, the best are the white-flowering *C. fragrans*, which blooms in late autumn; the scarlet-flowered *C. infortunatum*; and *C. fallax*, bearing brilliant scarlet flowers in September.

**Clésinger, Jean Baptiste Auguste** (1814-83), French sculptor and painter. His notable works before 1850 include a bust of Eugène Scribe (1844), and his marble figures of *A Woman Bitten by a Serpent* (1847), *A Young Nereid* (1847), and *A Bacchante Lying Down* (1848.) In 1853 he exhibited *Tragedy*, whose features resemble Rachel; and *Literature*, with a resemblance to George Sand. In 1847 he married a daughter of George Sand.

**Clevedon**, parish and watering place, Somerset, England. Its church contains the tombs of the historian Henry Hallam (1777-1859), and his son Arthur Hallam (1811-33), whose death inspired Tennyson's *In Memoriam*. Clevedon is referred to as 'the haven under the hill.'

**Cleveite**, a rare mineral found in the Arendal district of Norway. It consists of oxide of uranium associated chiefly with uranates of lead and thorium and of metals of the yttrium group in smaller quantity. It is considered to be a weathered variety of *broggerite*, another Norwegian mineral, from which it differs little in composition.

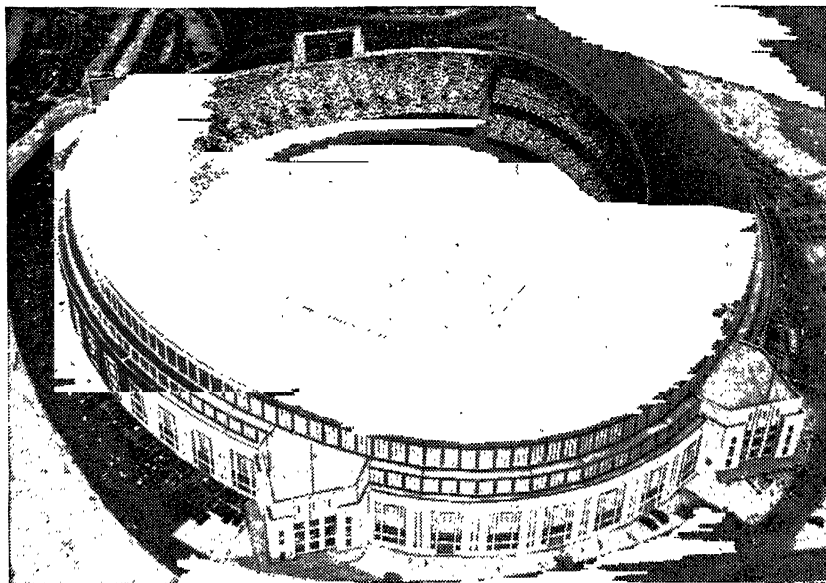
**Cleveland**, the largest city in Ohio, the county seat of Cuyahoga co., is located on the south shore of Lake Erie, at the mouth of the Cuyahoga River. Several trunk railway lines connect Cleveland with the rest of the United States. The largest fresh-water passenger steamships in the country supply daily service between Cleveland, Buffalo, and Detroit, and there is also through passenger steamboat service to Duluth and Chicago.

Cleveland has 14.2 m. of lake frontage, protected by a breakwater 5½ m. in length. The harbor has a spacious entrance, and there

is ample dockage for passenger service, and unexcelled facilities for the handling of iron ore. The Cuyahoga River is also lined with docks, adjacent to which are many furnaces, factories and lumber yards. The city, which has an area of 56.65 sq. m., lies on a plateau 100 ft. above the lake and 580 ft. above sea level. In the centre of the business section is the Public Square, which is quadrisedected by two of the principal streets, and from which radiate several avenues, whose diagonal layout greatly reduces the distance from cen-

of the Cleveland Chamber of Commerce, and which was drawn up by the Group Plan Commission, originally composed of Arnold W. Brunner, Daniel H. Burnham, and John M. Carrere, provides for the grouping of public buildings about a mall, extending from Superior Avenue to the lake front.

A center of interest in the downtown section is Playhouse Square, at the intersection of 14th Street, Huron Road, and Euclid Avenue. About this square are grouped the Hanna Building, Bulkeley Building, and the



*Cleveland: New Stadium.*

tre to suburbs. The eastern and western districts of the city are connected by viaducts.

The Public Square contains the Soldiers and Sailors' Monument (1894; \$280,000) and the statue of Moses Cleaveland, founder of the city. In Gordon Park is a monument to Commodore Perry, commemorating his victory over the British on Lake Erie in the War of 1812. Lakeview Cemetery contains the remains of President Garfield and a handsome monument in his memory. Cleveland's recreation facilities include 21 playgrounds, 4 public baths, 2 municipal dance halls, 57 baseball diamonds, 16 football grounds, 63 tennis courts, 53 skating ponds, and a municipal symphony orchestra.

The group plan of Cleveland, which is the outgrowth of many years' work on the part

theatres, the Allen, Ohio, State, Hanna and Keith's. Cleveland has 422 churches and missions, 7 convents, and a monastery. The Cleveland Public Library, the fourth building in the Group Plan of public edifices, cost about \$4,500,000. The Cleveland Museum of Art in Wade Park, formally opened in 1916, is a beautiful building of white marble of classical design.

Cleveland is conspicuous for its system of public instruction. Ten institutions which confer degrees are also located here, one of the best known being Western Reserve University.

The average annual mean temperature of Cleveland for a period of 33 years is 51.30° F. The normal rainfall is 35 inches. Cleveland's remarkable growth in wealth and population

is due mainly to its excellent geographical situation. It is the economic focus of the Lake Superior iron and the Middle State coal regions; and nowhere else in the United States can these two products be brought together with less cost for transportation. Cleveland is the second largest manufacturing center on the Great Lakes. Iron and steel, foundry and machine products lead, with the manufacture of automobiles second. Also important are the manufacture of clothing, paints, and hardware.

The site of the city was selected on July 22, 1796, by Moses Cleveland and his surveying party, representing the Connecticut Land Co., which had purchased from Connecticut a vast tract of Western lands. It was incorporated as a village, 1814; a city, 1836. Cleveland's attempted solution of municipal ownership problems, especially street railways, attracted wide attention. In May, 1914, a City Plan Commission was created; p. 878,336. In 1944 a disastrous fire occurred among the gas-storage plants; 112 persons were dead, 104 missing, and hundreds were homeless.

**Cleveland**, parliamentary district in England. It is crossed by the Cleveland Hills, which are noted for their exceedingly rich deposits of iron ore. Effective working began about the middle of the nineteenth century; the district now supplies about one-third of the total pig iron for Great Britain. Cleveland also gives name to a fine breed of horses.

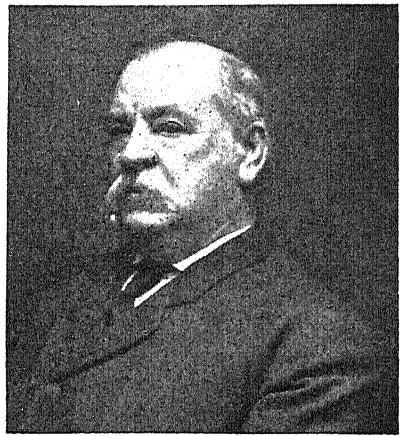
**Cleveland, Charles Dexter** (1802-69), American author and educator. From 1861 to 1867 he was U. S. consul at Cardic, Wales. He published: *Compendium of Grecian Antiquities* (1828); *Compendium of English Literature* (1850); *Compendium of American Literature* (1858); *Concordance to the Works of John Milton* (1867).

**Cleveland, Frederick Albert** (1865-1914), Am. publicist. He was instructor in finance at the University of Pennsylvania (1900-03); professor of finance at the New York University School of Finance (1903-05); an expert on many notable commissions, including that on the finances of New York City (1905) and President Taft's Commission on Economy and Efficiency. His published works include: *Growth of Democracy in the United States* (1898); *Funds and Their Uses* (1902); *First Lessons in Finance* (1903); *Organized Democracy: an Introduction to the Study of American Politics* (1913). He edited *Studies in Administration*, published by the Institute of Government Re-

search (1917-20) and was co-editor of *Municipal Research* (1910-17).

**Cleveland, John** (1613-58), English Cavalier poet, forfeited his fellowship at St. John's College, Cambridge, for having opposed Cromwell's election to the Long Parliament. He acted as judge advocate at Newark, and was arrested at Norwich (1655), but after three months' imprisonment was released by Cromwell, and died at Gray's Inn. He wrote many satires, and published *Poems*.

**Cleveland, (Stephen) Grover** (1837-1908), the twenty-second and twenty-fourth President of the United States, whose ancestor, Moses Cleveland, an Englishman, settled in Massachusetts in 1635. In 1855 he be-



Grover Cleveland.

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gan to study law in Buffalo, and there in 1859 was admitted to the bar. As a member of the law firm of Cleveland and Bissell gained a large practice. In 1881, as the Democratic candidate but largely by independent votes, he was elected mayor of Buffalo, where the Republicans were normally predominant. In this position he attracted such general attention by his efficiency and independence that in 1882 he was made the Democratic candidate for governor of New York, and was elected by an enormous majority over his Republican opponent, Charles J. Folger. As governor he insisted on the application of strict business methods in the administration of public affairs. His administration of this office, indeed, gave him a national reputation, and in 1884, when the national political situation was somewhat similar to what the

political situation in the state had been two years before, he was nominated for the presidency by the Democratic Party. The Republicans had previously nominated James G. Blaine. The campaign which followed was marked by almost unprecedented vituperation, the personal characters of each candidate being assailed and both candidates being mercilessly lampooned and vilified. As President (1885-9) Cleveland did much for civil service, also for army pension reform, and once more showed his independence by an unprecedentedly free use of the veto power, particularly as regards private pension bills. In his annual message of 1887 he vigorously advocated a revision of the tariff in the direction of free trade, and it was largely on this issue that, renominated by his party in 1888, he was defeated for re-election by his Republican opponent, Benjamin Harrison, though he received a plurality of the popular vote. In 1892, however, once more the candidate of his party, he defeated Harrison, the tariff issue being again to the front. President Cleveland's second administration (1893-7) was marked by his immediate withdrawal from the Senate of the Hawaii annexation treaty negotiated by his predecessor, by the repeal of the Sherman Silver Purchase Act of 1890, by the dispersal of rioters in Chicago by U. S. troops during the great Pullman strike (1894), by the enactment of the Wilson Tariff Bill, which the President allowed to become a law without his signature, by the difficulty with England concerning the boundary dispute between that country and Venezuela, Pres. Cleveland sending to Congress a somewhat belligerent message on this subject in Dec., 1895. In the dispute with Great Britain over the Venezuela boundary, Cleveland's insistence upon the Monroe Doctrine fixed its fundamental claim and meaning in the national consciousness, and his successors in the presidency have reaffirmed the principles then asserted by him. It may be said that his firm, though conservative, advocacy of his party's principles has been memorably epitomized in the phrase 'a Cleveland Democrat.' His public papers may be found in Richardson's *Messengers of the Presidents*, vols. viii, ix. (1898). See Whittle, *Grover Cleveland* (1896); Nevins, *Grover Cleveland* (1932).

**Cleveland Ironstone**, a well-known and important band of clay ironstone which occurs in the Middle Lias of Cleveland in Yorkshire, England. It is generally dark green in color, and contains about 60 per cent. of carbonate of iron, with a certain amount

of clay, silica, phosphates, and other impurities.

**Cleves**. See **Kleve**, **Anne of**.

**Clew Bay**, on w. coast of Ireland, is about 14 m. long by 8 m. wide, and contains many small islands. Clare I. stands at its entrance.

**Clews**, the lower corners of square-sails and the aftmost corner of fore-and-aft sails, the other lower corner being the tack. The clews of a hammock are the combination of small lines by which it is suspended.

**Clews, Henry** (1830-1923), American banker, born in England, became a partner in the New York firm of Stout, Clews and Mason in 1858, which under its later name, Livermore, Clews & Co., acted as the agent of the U. S. Government in selling bonds during the Civil War. In 1877 the firm of Henry Clews & Co. was organized. Mr. Clews published *Twenty-eight Years in Wall Street* (1888) and *The Wall Street Point of View* (1900).

**Clianthus**, a small genus of tender shrubs belonging to the order Leguminosæ, with pinnate leaves and uniquely showy flowers. The parrot's beak, or glory vine produces bunches of quaint scarlet, boat-shaped flowers, with large keels. The glory pea may also be grown out of doors south of Washington. It bears racemes of rich scarlet-and-black flowers.

**Click-beetles**, or **Skipjacks**, insects belonging to the family Elateridæ, whose larvæ, often called 'wireworms' are very destructive to crops. The adults live on herbs of various kinds, and when alarmed drop suddenly to the ground; the beetles then bend back the hinder part of the body, and suddenly releasing the tension are tossed into the air and alight on their feet. The spring is accompanied by a clicking sound whence the popular name.

**Client** in modern law. See **Principal and Agent**. The name was given in ancient Rome to a class of citizens to describe their dependence on a patron, who was a patrician. It was the duty of the patron to advise and protect his clients in legal affairs and to guard their interests; of the client to contribute to the dowry of his patron's daughters, to his ransom, or to payment of his legal or official expenses, and generally to serve his interests. In modern usage it is applied to one who employs an attorney or counsellor at law to conduct a lawsuit for him or to take charge of his legal affairs.

**Cliff Dwellings**. This term is specially applied to certain remarkable ruins found in Arizona, Utah, New Mexico, and W. Colo-

rado. The original dwellings consisted of one or more well-built houses of stone and lime, two or three stories in height, with rectangular doors and windows, in some degree suggesting an affinity with the Indian *pueblos* of the same region. The situation of these cliff dwellings is what constitutes their most remarkable features and gives them their name; for they are perched in cavelike, horizontal recesses of the almost perpendicular cliffs that line the gorges or cañons of that territory, appearing, at the first glance, inaccessible either from the cliff-top or from the valley below. In some cases a winding staircase or ladder of footholes has been cut in the steep rock face, from the valley up to the ledge on which the house is placed. But in most instances the ascent must have been made by a series of ladders of wood or of rope. Among the most important and interesting of the cliff dwellings are those in Mesa Verde National Park, Colorado. Consult Fewkes' *Archæological Expedition to Arizona and Antiquities of the Mesa Verde National Park*.

**Clifford, Sir Hugh** (1866-1941), English government official, was born in London. In 1883 he entered the Malay States civil service and subsequently held various offices. In 1914 he negotiated with French Colonial authorities the agreement entered into for the provisional administration of Togoland. His works include *In Court and Kampong* (1897); *Studies in Brown Humanity*, and *Since the Beginning* (1898); *In a Corner of Asia* (1899); *Bush-W hacking* (1901); *The Downfall of the Gods* (1911); *Malayan Monochromes* (1913); *The Further Side of Silence* (1916).

**Clifford, Lucy Lane** (d. 1929), English novelist, daughter of John Lane, and widow of William Kingdon Clifford. Her novels include *Mrs. Keith's Crime* (1885); *Aunt Anne* (1893); *Love Letters of a Worldly Woman* (1894); *Mr. Webster and Others* (1918); and *Miss Fingal* (1919). She is also the author of a number of plays and books for children.

**Clifford, Lydia Rosabelle Bonham, Lady** (1866- ), English novelist, wrote under the name of a former marriage, Mrs. Henry de La Pasture. Among her works are: *Peter's Mother* (1905); *The Lonely Lady of Grosvenor Square* (1907); *The Grey Knight* (1907). She also wrote several successful plays.

**Clifford, William Kingdon** (1845-79), English mathematician, was professor of mathematics and mechanics at University College, London, and was made a fellow of

the Royal Society in 1874. His works include *Elements of Dynamics* (1878), and *Lectures and Essays*.

**Clifton**, watering place, England, a suburb of Bristol, notable for the beautiful wooded gorge of limestone rocks through which the Avon here flows. A commodious spa and pump room have replaced the famous Hotwells known since the days of Fanny Burney. Observatory Hill has traces of Roman occupation.

**Climacteric.** See **Menopause**.

**Climacteric Years**, a term formerly applied to the seventh and ninth years of man's life, with their multiples by the odd numbers, which were considered critical points in one's life and fortunes. The sixty-third year—the multiple of the mystical numbers 7 and 9 was the *grand climacteric*.

**Climate**, a generalized term for the characteristic weather of any locality or region. The most important climatic elements are first, temperature; second, moisture in its various forms, as rainfall, cloudiness, and humidity; and third, wind. The most important determiners of climate are indicated below. 1. The most marked influence of latitude is due to the length of and intensity of sunshine, the effect of the solar rays being greatest at the equator, where they fall perpendicularly, diminishing in power as their obliquity increases with their approximation to the poles, where practically all their heat is absorbed by the atmosphere before they reach the earth's surface. 2. Distance away from the earth's surface as in the ascent of mountains. The decrease of temperature with height, under normal conditions, is 1° F. for every 300 ft.

3. The relative distribution of land and water is a most potent factor in the determination of climate, and this is especially the case in the presence of large deserts or oceans. 4. The climate of the ocean is profoundly affected by oceanic currents, which bring with them, to a certain extent, the climate of the region where they originate.

5. Proximity of mountain ranges materially affects the climate of places situated to leeward of them, deflecting the winds, which they drain of much of their moisture. Localities thus placed have much colder winters and hotter summers than regions lying to windward, which are protected by a screen of aqueous vapor from the full effects of both solar and terrestrial radiation.

6. The permeability or impermeability to moisture of various soils, also affects the climate. Sandy soils retain little moisture; but



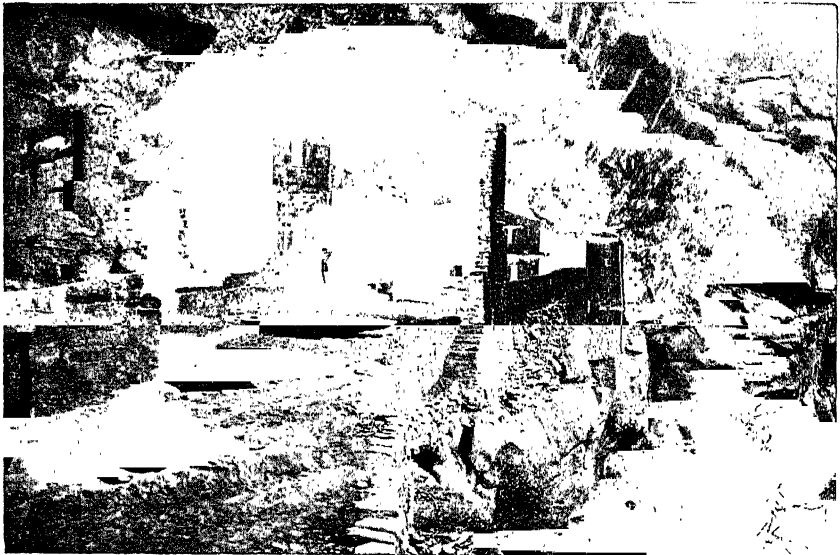
clays hold from ten to twenty times as much, and thus render the air in contact with them cold and damp. 7. Vegetation also affects climate, which is comparatively uniform and humid where the growth of trees and plants is luxuriant.

8. The effect of winds on climate is marked, for they bring with them the characteristic climatic features of the region of their origin. 9. Rainfall is an important factor, the precipitation purifying the air, and, for the time at least, decreasing the humidity. Racial characteristics are profoundly modified by climate. The geographical distribution of animals and

geons. An annual volume of transactions is published.

**Climbing Perch** (*Anabas scandens*), a bony fish, found in the East, particularly in the Ganges region of India. It is about six inches long, reddish olive in color, and has a remarkable superbranchial organ above the gills, which apparently assists the process of respiration when the fish is out of water. By means of the strong spines of its pectoral fins, it can move over land surface, and is even said to climb trees.

**Climbing Plants**, plants which climb by means of twining, or by tendrils, aerial roots,



*Cliff Dwellings, Mesa Verde National Park, Colorado.*

plants is also in great measure regulated by climatic conditions, the greatest perfection of development being found in regions where the climate is most suited to the requirements of the organism. See METEOROLOGY; consult publications of U. S. Weather Bureau; Davis' *Meteorology*; Huntington's *Civilization and Climate* (1915); Brooks' *The Evolution of Climate* (1922).

**Climatological and Clinical Association, American**, a society for research in climatology, hydrology, and diseases of the respiratory and circulatory systems, founded in New York in 1883. Annual meetings are held, and the association convenes every third year at Washington as a participant in the Congress of American Physicians and Sur-

or other structures. In the tropics they are often of imposing size and splendor, and even in temperate regions exhibit many forms of beauty. Some climb by twining the main stem around a support, revolving in, or opposite to, the direction of the sun's passage, according to species; some climb by tendrils; others by means of prickles; and yet others by means of aerial roots.

In gardens, climbing plants are of the greatest possible value for covering walls and trellises, concealing unsightly buildings, and covering arches, bowers, pergolas, old tree-stumps, pillars, and poles. Climbing plants are both annuals and perennials. Among climbers which are evergreen, at least in many regions, are the ivy, passion flower, Bignonia

capreolata, white jasmine, and some of the smilaxes. Consult Darwin's *Climbing Plants* and S. Arnott's *The Book of Climbing Plants and Wall Shrubs*.

**Clinedinst, Benjamin West** (1859-1931), American artist, was born in Woodstock, Va. His work in black and white has been largely devoted to the illustration of books and magazines, and his paintings in oil and water color have been principally genre work and portraits. He was elected a member of the National Academy in 1898.

**Clingman, Thomas Lanier** (1812-97), American political leader and soldier of the

ferentiated from a dispensary in that its primary object is to teach, treatment being offered as a means to this end.

**Clinical Medicine** (Gr. *kline*, 'bed'), the practical teaching of medicine or surgery by demonstration of disease and its treatment at the bedside, in hospital wards, etc.

**Clinker-built** (formerly 'clinker-built'; from *clinch*, 'to rivet'), a term applied to a boat or ship built with the lower edge of each plank overlapping the one below it, like the shingles on a roof.

**Clinometer**, an instrument used by surveyors, mining engineers, miners, and geologists for measuring the inclination or slope of surfaces. In its simplest form it consists of a plummet attached to a divided scale, so arranged that when the instrument is placed on a horizontal surface the extremity of the plummet is opposite to zero of the graduation; and if the surface is inclined, the angle of slope is recorded by the position of the plummet on the scale.

**Clinton**, city, Iowa, on the Mississippi River. Clinton is the seat of Wartburg College (Luth.), and its industries include large railroad shops, bridge works, corn syrup, glucose, and starch factories, and manufactures of boilers, machinery, locks, furniture, wire, wagons, and flour; p. 26,270.

**Clinton**, town, Massachusetts, Worcester co., formerly large textile center, now the home of The Colonial Press, Inc., largest book manufacturing plant. It also has distilleries and factories for making dolls, toys, and metal specialties; p. 12,440.

**Clinton, De Witt** (1769-1828), American political leader, was born in Little Britain, N. Y. He served in numerous political capacities and gradually he came to be the most influential leader of his party, the Democratic-Republican, in New York. In 1812, under circumstances which are generally regarded as being not altogether creditable to him he was the coalition candidate of the peace Republicans and the Federalists for the presidency against Madison, but was defeated. His principal service was rendered as canal commissioner of New York and as governor of the State (1817-22 and 1824-7), in which capacities he helped to establish the free-school system, secured the modification of criminal laws, did much for the promotion of science and did more than any other one man to bring about the construction of the Erie Canal, which by his opponents was long called derisively 'Clinton's Ditch.' Consult Ren-



*Climbing Plants*

1. Convolvulus (twining stem). 2. Ivy (aerial roots). 3. Sweet pea (tendrils). 4. Rose (prickles).

Confederate army in the Civil War. He devoted considerable attention to science; explored the mountains of South Carolina, and discovered the existence of various minerals in his native state. A volume of *Selections from the Speeches and Writings of Thomas L. Clingman* was published in 1877; he also published *Follies of the Positive Philosophers* (1878).

**Clinic**, strictly the examination and treatment of a patient in the presence of a class of students for their instruction. The term is popularly applied to an institution, usually in connection with a medical school, for the free treatment of patients who are able to go to and from their homes. A clinic may be dif-

wick's *Life of De Witt Clinton*, and Campbell's *Life and Writings of De Witt Clinton*. See BUCKTAILS.

**Clinton, George** (1739-1812), American statesman, was born in Little Britain, N. Y. He served under his father, Charles Clinton (1690-1773), in the French and Indian War; then was a member of the Continental Congress in 1775-7, and served during that time as a brigadier-general in the Continental Army. He was the first governor of the State of New York, serving in that capacity for eighteen consecutive years (1777-95), and again in 1801-4.

**Clinton, Sir Henry** (?1738-95), British soldier, prominent in the American Revolution, was born in Newfoundland. He was a member of Parliament (1772-84), and in 1794 became governor of Gibraltar.

**Clinton Stage**, in geology, a subdivision of the Silurian.

**Clio**, the muse of history. See **Muses**.

**Cliona**, a boring sponge, important in that it brings about the rapid disintegration of shells.

**Clione**, a genus of pteropod molluscs. It includes the little *Clione limacina*, important because it furnishes a large part of the food of the whalebone whale. There is no shell, and the animal swims by means of two lateral lobes of the foot placed at the sides of the head.

**Clipper**, a sailing ship built expressly for speed. Aberdeen, Scotland, was long celebrated for building swift tea-clippers, which since 1860 have been gradually superseded by steamers. The Baltimore clippers were also famous.

**Clisthenes**, famous Athenian reformer and lawmaker. He is known especially for his reforms of the Solonian constitution, which included the substitution of ten new Ionic tribes, named after Attic heroes, for four old ones, the establishment of a new council of five hundred, of a new magistracy, and of the generals (ten in number), and the introduction of ostracism. These reforms, which laid the foundations of the democratic *régime* in Athens, are generally dated 508 B.C.

**Clitheroe**, market town, England, in Lancashire. The church of St. Mary Magdalene is an ancient foundation, rebuilt, with the exception of the tower, in modern times. There is a sixteenth-century grammar school and the ruins of a Norman castle occupy a commanding position on the heights; p. 12, 204.

**Clitus**, a Macedonian, one of Alexander's

generals and friends, who saved Alexander's life at the battle of the Granicus in 334 B.C. Seven years later, at a banquet, when both were half intoxicated, Clitus provoked Alexander by ascribing his victories to his troops rather than to himself, and reproving the king for his love of luxury and flattery, and was slain by Alexander, whose remorse was afterward inconsolable.

**Clive, Catherine** (1711-85), English actress, popularly known as KIRTY CLIVE, made her appearance on the stage at the age of seventeen, and soon became the favorite comedienne of her time. In 1746 she became a member of Garrick's company, where she remained, except for a brief interval, until her retirement in 1769. She was a favorite with Handel, Garrick, and Horace Walpole, was admired by Fielding for her probity of character, and praised by Dr. Johnson for her intelligence and 'sprightliness of humor.' Consult Matthews and Hutton's *Actors and Actresses of Great Britain and the United States*.

**Clive, Robert** (1725-74), **Baron Clive of Plassey**, known to the natives of India as *Sabat Jung*, 'the Daring in War,' and justly called the creator of the Anglo-Indian empire, was born in England. At the age of eighteen he was shipped off to India as an incorrigible scapegrace, and entered the service of the East India Company as a writer. Clive, finding his clerkship distasteful, obtained a commission as ensign. He secured other commissions and showed marvelous skill and energy as a leader in battle. In 1753 he returned to England, worn out by anxiety and fatigue. He had gone out ten years before without friends and influence; he returned to be acclaimed by Pitt as 'the youth of twenty-seven years' who had accomplished the deeds of a 'heaven-born general.' Honors were showered on him; and with the prize-money which he had accumulated he paid off the debts on his parental estate, and unsuccessfully attempted to enter Parliament.

In 1755 Clive returned to India. After becoming head of the government of Calcutta, and winning other victories, Clive returned to England in 1760 and was received as the hero of the hour. In 1765 he returned to India as governor-general, and set himself to the work of purifying the administration. Clive's efforts at reform were bitterly opposed; and he raised up a host of enemies, who in 1767, when he finally returned to England in shattered health, brought about his impeachment for corrupt practices. It was during the parliamentary inquiry that Clive,

confronted with certain hostile evidence, made the characteristic and much-quoted remark, 'By God, Mr. Chairman, at this moment I stand astonished at my own moderation!' The House of Commons passed a resolution that 'Robert, Lord Clive, had rendered great and meritorious services to his country'; but its acquittal was practically a censure and Clive, broken in health, keenly sensitive to the disgrace of the verdict, and morally enfeebled by the use of opium, committed suicide in November, 1774, when but fifty years of age. Consult Macaulay's *Essays*; Colonel Malleon's *Clive*, in the *Rulers of India Series*; Holmes' *Four Heroes of India*; Forrest's *The Life of Lord Clive* (1918).

**Cloaca**, a sewer. In ancient Rome there were many of great size, of which the most famous is the *cloaca maxima*, 'the largest sewer', which passed under the Forum, and is still in use today. It is said to have been built in the reign of Tarquinius Priscus.

**Cloaca**, in vertebrates, the common chamber into which the ducts of the reproductive organs and of the kidneys open, together with the alimentary canal. A cloaca is present in birds and reptiles, and in the lowest mammals. It is replaced in the higher mammals by the anus and the urinogenital aperture.

**Clock and Watch Making**. See **Horology**.

**Clodd, Edward** (1840-1930), English writer, has written numerous works on folklore, evolution, and cognate subjects, including *The Childhood of the World* (1872), *Myths and Dreams* (1885), *Story of Primitive Man* (1895), *Primer of Evolution* (1895), *Pioneers of Evolution* (1897), and biographies of Grant Allen (1900) and T. H. Huxley (1902).

**Clodius**, Roman tribune and enemy of Cicero. See **CLAUDIUS**.

**Clœlia**, a Roman maiden, who, according to the ancient story, was sent as a hostage to Porsena when he attacked Rome. She escaped, however, and swam back to Rome across the Tiber; but the Romans sent her again to Porsena, who was so impressed by her honor and courage that he liberated her and her companions.

**Cloisonée**. See **Enamels**.

**Cloister**, a vaulted arcaded corridor surrounding the quadrangle or courtyard of monastic, ecclesiastical, and collegiate buildings of the middle ages. It was used for recreation and exercise, and adjoined the principal houses of the group. There are many beautiful examples of the cloister remaining,

though few are complete. At Oxford Priory church three sides 54 ft. wide remain. Wells cathedral shows interesting examples of different dates. Worcester cathedral is in the Perpendicular style. Other fine specimens exist at Salisbury, Gloucester, and Hereford, and in Italy and France.

**Clonmacnoise**, par., Ireland, on river Shannon. One of the most venerated places in Ireland. In 548 St. Kieran established a Culdee college, which became an important seat of learning. The 'Seven Churches,' with their crosses, towers, and graveyards, constitute an important group of ecclesiastical antiquities.

**Clonus**, a rapidly alternating contraction and relaxation of muscles, resulting in violent tremors of part of a limb. Ankle clonus is produced in certain diseased conditions of the brain or spinal cord, when the nerve centres are in an irritable condition.

**Cloots, Jean Baptiste du Val de Grâce, Baron de**, better known as 'Anacharsis' Cloots (1755-94), a notable figure of the French revolution. A rationalist, in response to Bergier's *Certitude des Preuves du Christianisme*, he published, under the pseudonym of Ali Gier-Ber, a satirical *Certitude des Preuves du Mahométisme* (1780). An enthusiast for the new ideas, he joined the Jacobin Club, in the spirit in which the Scythian Anacharsis entered Athens. He was returned to the Convention by the department of Oise, and voted for the king's death. Among his other political and philosophical works are *Adresse d'un Prussien à un Anglais* (1790); and *La République Universelle* (1792). See Avenel's *A. Cloots* (2 vols. 1865).

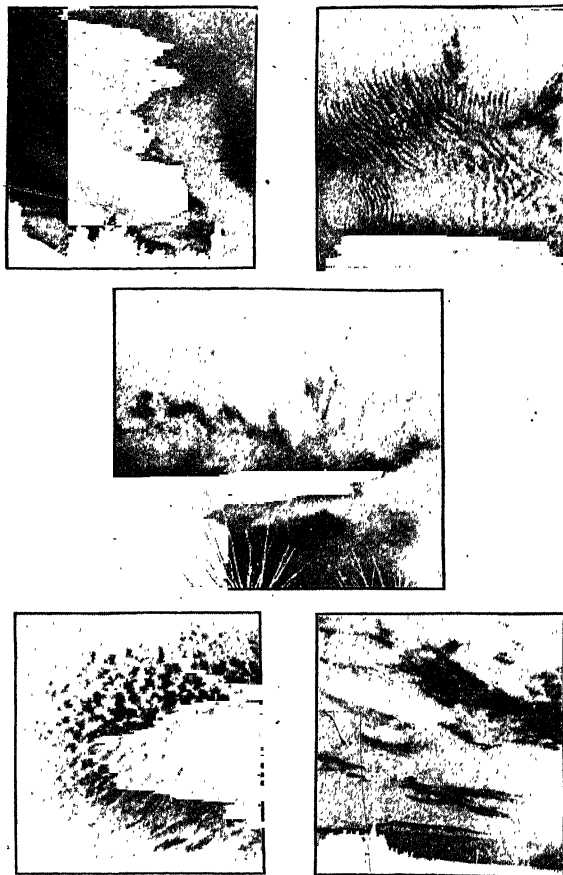
**Close**, the enclosure and buildings reserved, in the precincts of a cathedral, for the domestic use of the bishop and canons. The word is also applied in Scotland to the narrow passages leading from main streets to courts containing tenements or to adjoining streets.

**Close-hauled**, the trim of a ship's sails when sailing near to the wind—i.e. sailing in the nearest direction possible to the point of the compass from which the wind blows. When a ship is close-hauled, her tacks are hauled close down to her side to windward, and her sheets are hauled close aft. In this manner of sailing, square-rigged ships will make an angle of six points with the line of the wind; but fore-and-aft rigged ships will sail much closer. In each case there is always a certain amount of leeway.

**Clotaire I.** (497-561), king of the Merovingian Franks, youngest son of Clovis and Clothilde, received the northern third of the kingdom when it was divided between himself and his brothers (511); then he joined Childebert in the slaughter of the sons of their brother Clodomir, and in the conquest

the age of four months (584), under the guardianship of his mother Fredegonda, becoming sole king in 613. He overran Austrasia and Burgundy, captured and put to death Brunhild, seized her dominions, and reunited under his sway the empire of Clovis.

**Cloth.** See **Fabrics, Textile.**



*Forms of Cloud.*

Upper Left, Cirro-stratus. Upper Right, Cirro-cumulus. Center, Cirrus. Lower Left, Alto-cumulus. Lower Right, Alto-stratus.

of Burgundy, which they divided between them (532); and by the death of a fourth brother (555) and of Childebert (558) he became sole king of all the Franks, and warred against the Saxons and Thuringians.

**Clotaire II.** (584-628) succeeded his father, Chilperic I., as king of the Franks, at

**Clotho**, one of the Fates.

**Clothilde, St.** (475-545), daughter of Chilperic, king of the Burgundians. She was married to Clovis, king of the Franks, whom she converted to Christianity. After Clovis's death she retired to a monastery at Tours, and was canonized by Gregory of Tours with

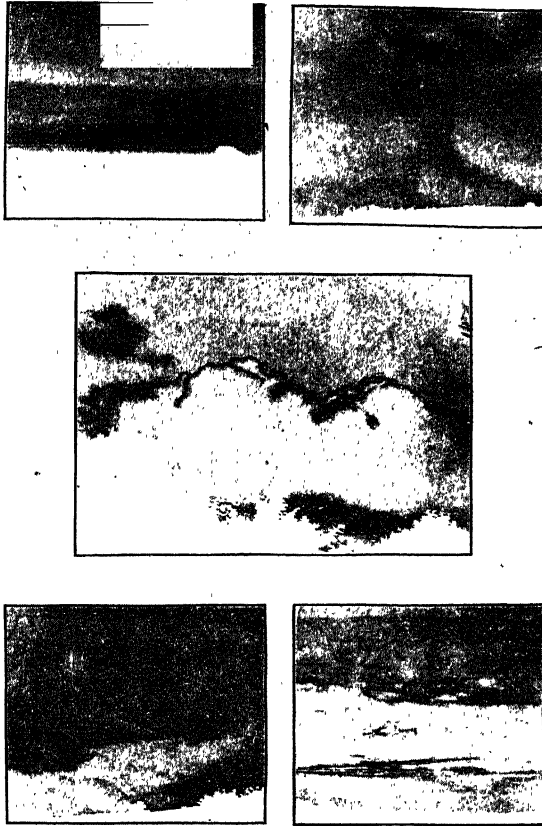
the holy sanction of Pope John the Third. **Clothyard**, old measure of length. (See YARD.) The clothyard shaft was distinctive of English bowmen.

**Cloud.** Mist is caused by the condensation of the aqueous vapor in the air into minute globules of water, and clouds may be defined

Riggenbach, and L. Teisserence de Bort (1896). The following classification was finally adopted:

A. UPPER CLOUDS (average alt. 30,000 ft.).

*Cirrus* (Lat. 'a hair'); 'Mares' tails'; delicate detached clouds, taking the form of feathers or thread fibres, often arranged in



*Forms of Cloud.*

Upper Left, Strato-cumulus. Upper Right, Nimbus. Center, Cumulus. Lower Left, Cumulo-nimbus. Lower Right, Stratus.

as elevated mists. Sometimes the condensed vapor of clouds is frozen into minute crystals of ice and snow. In August, 1894, a meeting of the International Meteorological Congress was held at Upsala, when over 300 cloud pictures from different parts of the world were exhibited, and typical examples selected. These are given in the *International Cloud-Atlas* by H. H. Hildebrandsson, A.

belts which cross a portion of the sky in great circles; of great importance in weather forecasting. Cirrus and other clouds of this class are composed of ice crystals which refract light and produce the phenomena of halos. *Cirro-stratus*, or 'sheet clouds', is a thin whitish sheet which at times completely covers the sky, and is frequently the precursor of unsettled weather.

B. INTERMEDIATE CLOUDS (between 10,000 and 23,000 ft.)

*Cirro-cumulus*, or 'mackerel sky', consists of small globular masses or white flakes arranged in groups and lines; essentially a fine-weather cloud.

*Alto-cumulus*, or 'flock clouds', consists of fairly large globular masses of white or gray cloud arranged in groups and lines, and often very closely packed.

*Alto-stratus* is a thick sheet of a grayish or bluish hue, which presents a brilliant appearance in the vicinity of the sun or moon.

C. LOWER CLOUDS (6,500 ft.).

*Strato-cumulus* are large globular masses or rolls of dark clouds which frequently cover the whole sky; common cloud in winter; a fair-weather cloud.

*Nimbus*, or 'rain-cloud,' consists of a thick layer or system of clouds with ragged edges from which rain is falling.

D. CLOUDS OF DIURNAL ASCENDING CURRENTS.

*Cirro-cumulus*, or 'wool-pack' clouds are dome-shaped with horizontal base; a fair-weather cloud.

*Cumulo-nimbus*, or the 'thunder cloud,' takes the form of heavy mountainous turrets of cloud, with irregular base; a rain cloud.

E. HIGH FOGS (under 3,300 ft.).

*Stratus*, or 'ground fog,' a horizontal sheet of lifted fog, usually formed by condensation. Stratus is usually a fine-weather cloud, appearing in settled weather during the evening and morning hours. See FOG, DUST, NEPHOSCOPE, and numerous papers by Professor F. H. Begelew in Reports of U. S. Weather Bureau and Monthly Weather Review.

**Cloudberry**, or **Ground Mulberry**, the orange-colored fruit of a dwarf herb (*Rubus Chamamorus*). The plant grows only in swampy, northern districts. Large quantities are eaten in Scandinavia and sub-Arctic America, partly in the raw state, partly after being made into preserves.

**Cloud-line** is the level below which clouds seldom form, being about 9,000 ft. in South America and about 5,000 ft. in Tyrol, while in Washington, D. C., there is a variation in the mean height of clouds from 30,000 to 3,000 ft.

**Clouet**, the name of a family of French portrait and miniature painters of Flemish origin. JEAN CLOUET, the elder (d. 1490), was employed by the duke of Burgundy.—JEAN CLOUET, the younger (1482-1514), was

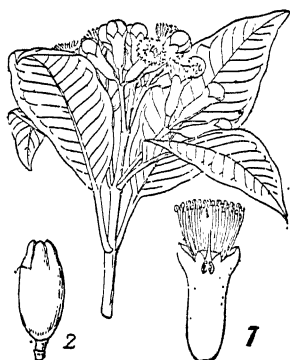
court painter and valet to Francis I. of France, being called, in documents, Jehan, Jehannot, and Jehannet.—His son, FRANÇOIS (?1510-77), was born at Tours. His miniatures and portraits are distinguished by delicacy of form, pale simple tones without chiaroscuro, Flemish love of finished detail, and French elegance. A fine series of his drawings is in the National Library, Paris; some crayon heads in the British Museum; also examples of portraiture are in Berlin, Vienna, Munich, Florence, Dresden.

**Clough, Arthur Hugh** (1819-61), English poet, born in Liverpool though of Welsh blood. Attracted by the political and social movements of the day, he visited both Paris and Rome in times of revolution. Already a pamphlet, occasioned by the potato famine in Ireland, had earned him the reputation of a socialist. He sailed for the U. S. in 1852, and settled at Cambridge, Mass., living by literary and scholastic work and enjoying the friendship of Lowell, Longfellow, and Emerson. He died at Florence, Italy, where he is buried. Clough's poetry is remarkable rather for purity and dignity of thought than for literary finish. His lovable personality and vexed life inspired the beautiful monody of *Thyrsis*, written upon him by Matthew Arnold. Works: *A Consideration of Objections against the Retrenchment Association at Oxford* (1847); and others. Collected works: *Poems* (ed. F. T. Palgrave, 1862, with Memoir); *Poems and Prose Remains*, with a selection from his *Letters* and a *Memoir* (ed. by Blanche Clough, 1869).

**Clough-Leighter, Henry** (1874- ), American musician and composer. In 1901 he accepted an editorial position with a Boston music publishing house. His compositions include several oratorios, cantatas, and church services, besides many songs.

**Clove**, the dried, unexpended flower-bud of a beautiful evergreen shrub, *Eugenia caryophyllata*, or *Caryophyllus aromaticus*, belonging to the order Myrtaceæ. The plant is a native of the Moluccas, but since 1830 it has been especially cultivated in Zanzibar. The clove was, however, known to the ancient Romans. Dried cloves are about half an inch long, of a dark-brown color, and consist each of a cylindrical tube, surmounted by a four-toothed calyx and a round knob—the unopened corolla. They are possessed of a characteristic hot and aromatic taste and smell, and contain about 16 per cent. of volatile oil, or essence of cloves.

Cloves are used medicinally as a carminative and stimulant; and as a spice in cookery.



*Clove.*

1, Section of flower; 2, fruit.

**Clovelly**, par. and vil., Devonshire, England, noted for its picturesque scenery. Dickens describes it in *A Message from the Sea*. Near it is an ancient British camp, called Clovelly Dykes.

**Clover**, a genus of annual, biennial and perennial plants of the order Leguminosæ, containing many widely distributed species, of which red clover, alsike clover, crimson or



*White Clover (Trifolium repens).*

Italian clover, and white clover, are most commonly known. Berseem or Egyptian clover is the great forage crop of Egypt. Numerous species of clover of little or no importance grow wild in both hemispheres. In addition to the true clovers or plants of the genus *Trifolium* there are a number of plants commonly called clovers which belong to other genera of the order, as for instance

bur clover; snail clover, represented by several species of the genus *Medicago*; sweet or Bokhara clover; Japan clover and several species under the name of bush clovers. The great value of clover lies in its varied uses. It is grown for green fodder, silage, hay, pasturage, green manuring, and as a cover crop. Its culture improves the land, and hence it is generally found in crop rotations wherever its growth is successful. The large and deep root system of clover in itself improves the physical condition of the soil and adds to its fertility.

Red clover, a biennial and the most important species for the U. S., is almost universally grown. White clover is commonly



*Red Clover (Trifolium pratense).*

found as a wild-growing perennial, but is also used for lawns and meadows. See U. S. Dept. Agr., Farmers' Bul. 123; Division of Botany Circular 18 and 24; *Clover Culture*, by Henry Wallace.

**Clovis** (Ger. *Chlodwig-Ludwig*; Fr. *Louis*), the name of several Merovingian kings of the Franks. CLOVIS I. (465-511) succeeded his father (481) as king of the Salian Franks at Tournai. He founded the kingdom of the Franks, and in 496 became a Christian. He annexed Aquitaine and Toulouse, and transferred his residence to Paris. By contriving the death of all rival kings, he sought to unite all the Franks into one kingdom.

**Clowes, Sir William Laird** (1856-1905): Eng. naval writer and historian; acted as special correspondent in naval matters to the *Standard*, the *Daily News*, and the *Times* (1885-95), and after that, under the pseudonym 'Nauticus' and his own name, wrote much for English and foreign periodicals, exercising considerable influence upon naval opinion. His works include *The Naval Pocket-Book* (annually), *The Navy and the Em-*



pire, etc., *Black America: a Study of the ex-Slave and His Late Master* (1892), and several volumes of fiction, including *The Great Peril* (1893); *The Double Emperor* (1894). He contributed many articles on naval subjects to this Encyclopædia.

**Clown.** See **Jester**.

**Clubbing, Club-root, and Fingers-and-toes** are names given to a disease which frequently attacks the roots of cabbages, turnips, stocks, and other cruciferous plants. The disease manifests itself in nodular protuberances on the roots, with subsequent gradual decay of the plants themselves. The disease is infectious, for fresh young cruciferous plants, when placed in a tainted soil, soon become affected by it.

**Club-foot** (Talipes). Most commonly this is a congenital deformity. Several possible causes are suggested—nerve lesions, malposition before birth, abnormal growth of bone, and others. A long-continued malposition before birth seems the most likely. In some cases there is an element of heredity, and it is often associated with other physical defects. Acquired talipes most commonly follows on infantile paralysis. Where the deformity is slight, and the foot can be brought by manipulation into a proper position, then manipulation, massage, support, and in some cases electricity, to weakened muscles, should all be tried for some time before any operative treatment is used. On the other hand, where manipulation will not bring the foot into a normal position, operative treatment must be used to remove the obstacle, and the foot must then be retained in good position by artificial appliances as long as may be necessary.

**Club-hand**, a rare congenital deformity, in which the hand is fixed in varying degrees of flexion or over-extension of the wrist-joint, with possibly also a lateral twist. The bones of the wrist-joint are not fully developed, and the child is generally ill-developed and does not live.

**Clubs**, societies of persons combined for the promotion of some common object, whether political, social, or otherwise. The old Athenians had their clubs, friendly meetings where every one sent his own portion of the feast, bore a proportionate part of the expense, or gave a pledge at a fixed price. The Spartans and Romans had similar institutions. A famous English club was the one at the Mermaid Tavern, among whose members were Shakespeare, Raleigh, Beaumont, Fletcher, and Selden. From England

clubs spread to the United States, and by the middle of the 19th century well-organized clubs were found in many American cities, while all the large centers now boast clubs second to none in their buildings and appointments.

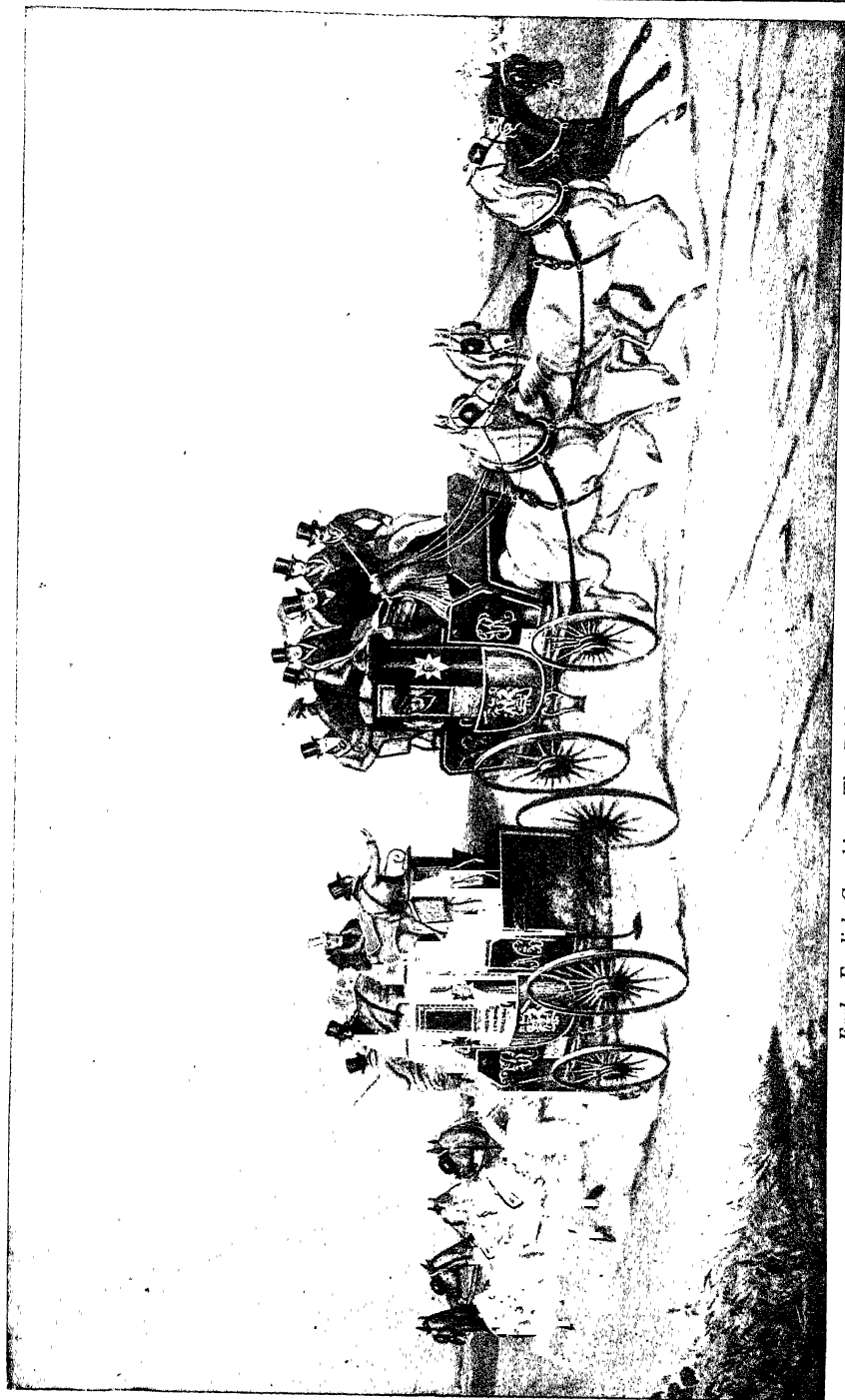
**Clubs, Law Relating to.** As regards liability to the outside public, the law affecting the members of a club depends upon the constitution of the club, *i.e.*, whether it is incorporated under the corporation laws of a state, or merely organized by means of a contract of association, each member becoming a party to it upon joining the club. In all clubs, whether incorporated or not, the contract between the members which regulates their rights, duties, and privileges *inter se* is contained in the rules. A so-called proprietary club is more of a business enterprise than a true club, as certain club privileges are furnished by an individual for a consideration, and the 'members' have no property rights and no voice in the management. This type is more common in England than in the United States, where gambling 'clubs' are about the only kind conducted on this principle.

**Cluny, or Clugny**, tn., France, owes its origin to the famous Benedictine abbey founded in 910 by William, Duke of Aquitaine. About the end of the 11th century the abbey rivalled Rome as one of the largest and richest seats of learning in Christendom. Its cathedral was only surpassed by St. Peter's; p. 4,108.

**Cluseret, Gustave Paul** (1823-1900), French officer and revolutionist, served in the French army; with Garibaldi in Italy, 1860; in the U. S. Civil War; and with the Turks in 1878. At times he engaged in revolutionary journalism in France and America. See his own *Mémoires* (1887).

**Clusium.** See **Chiusi**.

**Cluster**, in astronomy, a collection of stars presumably in physical connection. Globular are distinguished from irregular clusters by their central compression and unmistakably spherical forms. They have, notwithstanding, outlying branches and streaming edges, and it is far from certain that the thousands of stars aggregated in each constitute stable systems. The brightest show to the eye as hazy spots of light, high optical power being needed to resolve them completely. Others, even with large telescopes, look like piles of silver sand. Professor Bailey has recently made the extraordinary discovery that many globular clusters are



*Early English Coaching—The Brighton Mails From a Colored Print.*

crowded with stars losing and regaining a large proportion of their light in periods of a few hours. The Pleiades are typical of irregular clusters. They are much less definite assemblages than the globular kind, conform to no perceptible law of compression, and their components fluctuate in light vaguely, if at all. Clusters of both varieties frequent by preference the Milky Way, and clearly belong to the great galactic organization.

**Clutch** is a means by which connection may be made or broken between a motive power and the machinery which it is required to drive. A clutch is used to connect the engine with the driving-wheels of motor cars, etc.

**Clutha**, or **Molyneux**, riv. in New Zealand, 154 m. long, is navigable by small steamers for 40 m. Its alluvial deposits are rich in gold.

**Cluver**, or **Clüver** (Lat. **Cluverius**), **Philipp** (1580-1622), German historian and geographer. After an adventurous and necessitous life, traveling in England, Scotland, France, Germany, Switzerland, and Italy, he settled in Leyden, in 1615, and being appointed next year *Geographus Academicus*, was enabled to continue his literary work. Cluver is considered to be the founder of historical geography; and among his works, which were for a long time standard books, are *Germania Antiqua* (1616 and 1630), *Sicilia Antiqua* (1619), and his principal work, *Italia Antiqua* (1624).

**Clyde**, a large and important river of Scotland, flowing into the Firth of Clyde. The total length is 105 m. The current is never rapid, for at the source the altitude is only 1,600 ft. above sea-level. Midway between the source and Glasgow are the famous falls of Bonnington, Corra, Dundaff, and Stonebyres Linns. The Clyde had no commerce until, at the beginning of the 18th century, the people of Glasgow saw the importance of fostering trade with America. In the second quarter of the 19th century the great shipbuilding industry sprang into existence. Some of the largest vessels of the world are built on the Clyde, and the tonnage launched in a single year has exceeded 400,000.

**Clydebank**, tn. and par., Dumbartonshire, Scotland, on r. b. of Clyde, 5½ m. n.w. of Glasgow; shipbuilding yards and sewing-machine works, Singer's, at Kilbowie; p. 37,547.

**Clydesdale** or **Paisley Terrier**, a rare

breed of dog similar to the prick-eared Skye terrier; but the coat is silky in texture, and the color a glossy blue on the back, with tan legs and face-markings. The weight should not exceed 20 lbs.

**Clytæmnestra**, born from one of the eggs produced by Leda when Zeus had visited her in the form of a swan. She married Agamemnon, king of Mycenæ; and, in revenge for his having sacrificed Iphigenia to secure the voyage of the Greek force to Troy, transferred her affections to Ægisthus during her lord's absence at the war, and murdered the latter on his return. Ultimately her son Orestes killed her. Homer in the *Odyssey*, Æschylus in the *Agamemnon* and *Choephori*, Sophocles in the *Electra*, and Euripides in the *Electra* and *Iphigenia in Aulis*, tell the story.

**Cnidus**, ancient city in Asia Minor, on the promontory of Triopium (now Cape Krio) in Caria; colonized by Dorian settlers from the Peloponnesus. In 394 B.C. the Athenian Conon, commanding the Persian fleet gained a great victory near Cnidus over the Spartans. Later, Cnidus became famous for a celebrated statue of Aphrodite by Praxiteles. Its ruins still exist.

**Cnossus**, or **Gnossus**, now Malarotichos, an ancient town in Crete, the capital of Minos. See CRETE.

**Coach Dog**. See **Dalmatian Dog**.

**Coaching**. The early history of coaching is not clear. It has been maintained with considerable energy, although without much proof, that a rough coach or road-wagon ran as a public conveyance between Edinburgh, Scotland, and Leith as early as 1610, and this may fairly be accepted as the origin of coaching. Pepys writes in his diary under date of 1665 of springs on certain carriages, and it is known that about 1675 at least six stage-coaches existed in England. Coach and carriage building, however, had not progressed very far until a good deal later than this. In the spring of 1669 a coach described as the 'Flying Coach' ran from Oxford to London in one day and was welcomed in the latter city by all the dignitaries of the place. In America carriages were in use as early as 1685. The earliest mentioned coach or road-wagon ran from Boston to Newport in 1686, and then lines were put on between the cities along the Atlantic Coast, so that there was more or less continuous transportation between Portsmouth, N. H., and Savannah, Ga. The first regular coach was run fortnightly between New York and Philadelphia

in 1720. After that many lines were established, and the spirited rivalry was the cause of serious accidents from fast driving. In 1812 it took six days to travel from Philadelphia to Pittsburgh, a distance of 297 m. The vehicles first in use carried 16 passengers and were very cumbersome; but they later gave way to the egg-shaped coach, carrying 9 passengers inside and 4 to 7 outside. The Concord coach followed, the first of this type having been built in 1827; it was adopted all over the world with modifications. Of amateur coachmen and coachmanship in the last century comparatively little is known; but when good roads became the rule instead of the exception, 'gentleman coaching' became a fashionable amusement. Amateur coaching in the United States is usually dated from 1864, when August Belmont put his coach upon the road; and 11 years later, mainly as a result of the efforts of Leonard Jerome, the New York Coaching Club was founded. Consult W. O. Tristram's *Coaching Days and Coaching Ways*; G. A. Thrupp's *History of Coaches*; A. Carnegie's *An American Four-in-Hand in Britain*.

**Coadjutor**, an assistant and often the successor of a bishop who, on account of age or infirmity, is unable to discharge the duties of his office. A coadjutor differs from a suffragan in that the latter is assistant to a bishop who, owing to the great extent of his see, cannot fulfill all his obligations.

**Coagulation** is the term applied to the separation of a viscid or semi-solid mass from a liquid under the influence of heat or of chemical action. The process varies in various substances. Albumin, or white of egg, coagulates at a temperature of 160° F. Milk is coagulated or curdled by the action of rennet or by acids, etc. The blood and lymph of man and animals coagulate when taken from the body. See BLOOD; CHEESE.

**Coahuila**, state, Mexico, separated from Texas on the north by the Rio Grande. To the northeast the state is mountainous; the west is occupied by the wilderness of the Bolson de Mapimi, while along the valley of the Nasas River, to the south, agriculture is well developed. Coahuila has an agreeable and healthful climate. The rainfall is somewhat uneven—scarce in the lowlands, but abundant in the southern part. Agriculture is the principal pursuit. Much fine natural pasture exists, and stock raising is successful and lucrative. There are large tracts of the guayule rubber plant. The state is rich in min-

eral deposits, especially silver and coal, which are mined in increasing quantities. Copper, gold, lead, iron, zinc, sulphur, and onyx are also found. Cotton factories and flour mills are in operation. The chief towns are Saltillo (the capital), Monclova, and Parras; p. 367,652.

**Coal**, a compact mineral of vegetable origin, ranging in color from dark brown to black, and consisting chiefly of carbon, hydrogen, oxygen, and nitrogen. It is readily combustible, has a high calorific value, and is the principal source of fuel for domestic and manufacturing purposes. When distilled coal yields Coal Gas (see GAS MANUFACTURE) and Coal Tar, the latter the principal source of benzene and numerous other products. Coal is found most abundantly in the upper part of the Carboniferous formation. The period represented was one of the most remarkable of which there is any record in the geological history of our planet. Enormous areas of the earth's surface were covered with dense forests, which grew in lagoons and marshy situations. The whole land must have been very flat, and little above the level of the sea—a sort of fen land, or something similar to the great deltas of tropical rivers. The climate was warm, equable, and moist; the atmosphere probably relatively rich in carbon dioxide. The growth of vegetation must have been rapid, and dark evergreen plants and ferns lent a sombre aspect to the scenery. As yet there were no flowers, no birds, and none of the higher quadrupeds.

Prolonged but very slow settling was in progress; and when for many years the marshy vegetation had densely clothed the soil, it was carried down below the water and covered over with mud or sand. Then, by some slight upheaval or gradual silting up of the sea bottom, a land surface was once more formed, luxuriant vegetation again sprung up, in course of time decayed, sank, and became overlaid with silt and sand as before. The vegetable layers thus deposited, subject to the heat of the earth and of decomposition, and to the pressure of accumulating masses of stratified matter, were gradually mineralized into coal. The changes which take place in the conversion of vegetable matter into coal are partly chemical and partly structural. The oxygen, hydrogen, and nitrogen of the woody fibre tend to be expelled in the form of methane (marsh gas) and carbonic acid gas, while the carbon increases in proportion as the process advances, till in anthracite coal it forms nearly

the whole of the resultant mass. The color is altered from brown to black; the specific gravity increases; and with the higher percentage of carbon the heat given out during combustion becomes greater.

The varying amounts of carbon, hydrogen, oxygen, and nitrogen present in the different stages of coal formation are as follows: peat has 50% carbon, with 43% oxygen; lignite 69% carbon, with 25% oxygen; bituminous coal, 82% carbon, with 13% oxygen; and anthracite, 95% carbon, with only 2.5% oxygen. The hydrogen content varies from 6% in peat to 2.5% in anthracite, the nitrogen from 1% to zero. The carbon is usually present as both 'fixed carbon' and hydrocarbons. Hydrogen occurs also with oxygen in the form of moisture. There are also other minerals in small quantities. The thickness of the coal beds varies in different areas.

The coal seams vary in thickness from less than an inch up to 40 ft. or even over 80 ft., as in one case in Wyoming; but when they are very thick they consist, as a rule, of a number of beds, which are usually separated by partings of shale and other rocks. The intervening masses may thin out locally, and the coals come together to form what seems to be one bed of great thickness. A single coal seam is sometimes of considerable extent, and may be traceable over the whole of a field, though perhaps known under different names in different districts. Such a seam may thin out and die away, or pass into a carbonaceous shale; or it may split up into several thin seams separated by partings. Seams under two feet in thickness are worked only in exceptional cases. Taken as a whole, however, coal seams are extraordinarily persistent and remarkably pure. The latter feature is supposed to be due to the water which filtered into the coal lagoons having had its mud and suspended mineral matter almost entirely removed by the roots and stems through which it flowed.

Besides its solid constituents coal contains certain dissolved gases, the principal being carbon dioxide, methane, and nitrogen. The carbon dioxide is known as 'choke damp,' while the methane, being inflammable, is the 'fire damp' of the miner. These gases seem to be produced by the liberation of the volatile hydrogen and oxygen during the mineralization to which the ligneous material has been subjected. Given off in large quantities they are exceedingly dangerous in underground workings (see COAL MINING; METHANE; SAFETY LAMPS).

The composition of any particular coal is determined by analysis, two methods being employed—the proximate, and the elementary or ultimate. In proximate analysis the constituents are grouped in their natural associations as they appear under normal burning conditions—as moisture, volatile hydrocarbons, fixed carbon, and ash; in ultimate analysis the percentage of each chemical element is determined, as carbon, hydrogen, nitrogen, oxygen, sulphur, etc. A proximate analysis is sufficient to indicate the behavior of the coal as a fuel, and is sufficient for ordinary technical purposes.

The heat value of coal is dependent upon the amount of carbon and hydrogen present, and may be roughly calculated from the proximate analysis, or more closely from an ultimate analysis. The usual method, however, is to burn a sample in a closed steel-bomb calorimeter (see FUELS, CALORIFIC POWER OF).

Various classifications of coals have been made. The simplest divides them into three main groups, exclusive of peat—Lignites, Bituminous Coals, and Anthracite—with the intermediate groups, Sub-bituminous, Semi-bituminous, and Semi-anthracite.

*Lignites*, or *Brown Coal*, occupy a position in coal formation between peat and bituminous coals. They give out much smoke and comparatively little flame, and their heating power is small.

*Bituminous coals* include the larger proportion used for manufacturing purposes. They are dark brown to pitch black in color; soft, brittle, and opaque; often breaking in rhomboidal or cuboidal blocks; and with certain faces smooth, clean cut, and shining, while others are dull and glistening. They are rich in volatile hydrocarbons, and burn with a long yellow smoky flame. When heated in a closed vessel they give off large quantities of combustible gases, while a dark, semifused, sintering mass remains, termed *coke*.

*Cannel coal* is a hard bituminous coal similar to other varieties in composition, but differing in texture. It is compact, dull in appearance, and does not soil the fingers when handled. Cannel coal is rich in hydrocarbons, and gives off much gas, which burns with a bright, clear flame. It is largely used as a gas coal.

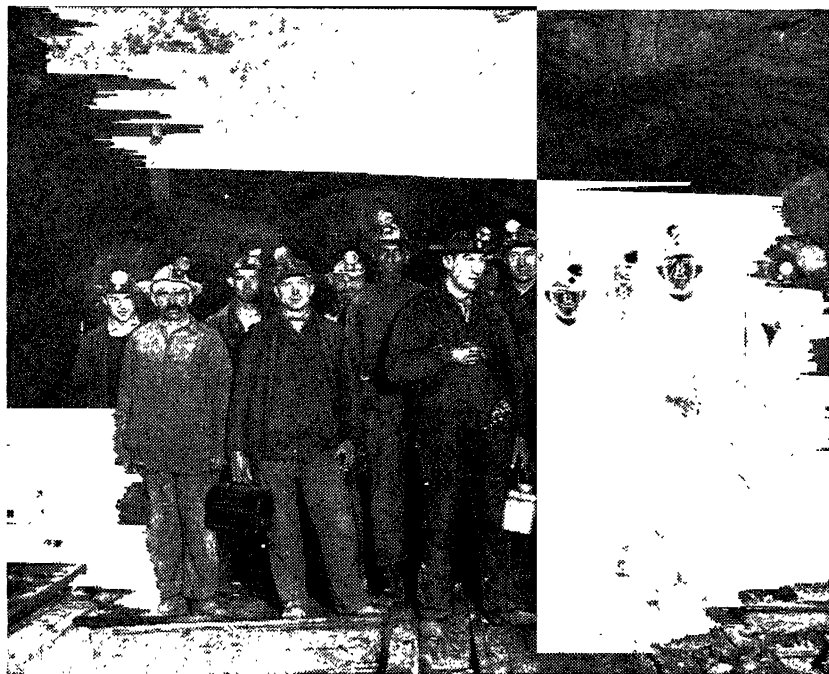
The *anthracites* contain the highest percentage of fixed carbon and the lowest percentage of volatile ingredients. They are the hardest of all the coals, deep black in color, have a sub-metallic lustre and a specific

gravity of 1.3 to 1.8. They burn slowly, giving out great heat and almost no flame, as they evolve only small quantities of gas when heated. Northern Wales and Eastern Pennsylvania are the principal sources of this coal (see ANTHRACITE).

*Coal Fields.*—Any area in which coal occurs in commercial quantities is known as a coal field. The coal fields of the United States rank first in area, the known coal areas aggregating a total of 339,887 sq.m., to which may be added 89,482 sq.m. supposed but not definitely known to contain

Michigan. (4) The Northern or Great Plains province, which includes North Dakota and South Dakota, and Wyoming and Montana. (5) The Rocky Mountain province. (6) The Pacific Coast province. The anthracite fields of the United States are confined almost wholly to an area of 485 sq.m. in Eastern Pennsylvania. Extensive fields of various ages also occur in Alaska.

Canada has large supplies of bituminous and sub-bituminous, situated for the most part in the western interior, although there are important fields on both coasts. The coal



*Coal Miners, after day's work waiting to be brought to surface.*

workable coal, and 28,470 sq.m. in which the coal lies at depths of 3,000 ft. or more. The U. S. Geological Survey separates the coal areas of the United States into six divisions or provinces, as follows: (1) The Eastern province, which includes the Appalachian region; the Atlantic Coast region, including the fields of North Carolina; and the anthracite region of Pennsylvania. (2) The Gulf province, which includes the fields of Alabama, Mississippi, Louisiana, Arkansas, and Texas. (3) The Interior province, which includes all the bituminous areas of the Mississippi Valley region and the coal fields of

fields of Great Britain are the principal source of its mineral wealth. In England and Wales the total exposed area is 2,786 sq.m.

Germany is the leading coal country of Continental Europe, the principal fields being those of the Ruhr or Westphalian Basin, Upper Silesia, and the Saarbrücken. France has numerous isolated deposits grouped in three main fields; while Belgium, Austria, Hungary, and Spain have deposits of importance. Coal is also worked extensively in South Africa, Australia, India, Japan, and China, and there are important beds in South America. The Chinese coal fields are prob-

ably the largest in the world, with the exception of those of North America.

In the early 1940's new uses were discovered for many of the by-products of coal. They were used in the production of explosives, ammunition, paints, laquers, fertilizers, and pyradine, the base for the germicidal 'sulfa' family.

See FUELS, also the sections on *Mining and Mineral Resources* in the articles on the various countries and States. Consult *Mineral Resources of the United States*, issued annually by the U. S. Geological Survey, and *Reports* of the various State surveys.

**Coalinga**, city, Fresno co., California; the center of an important oil field, with more than 1,300 oil wells, and an annual production of about 20,000,000 barrels of petroleum. There are oil field supply houses, refineries, and machine shops; p. 2,851.

**Coaling Ship**, the providing of ships at various stations with the coal necessary for their progress and safety.

**Coaling Stations**, ports where steamers or other vessels may obtain fuel for their operation. In some cases they are government owned and are maintained primarily for naval purposes; they are sometimes acquired by lease from a friendly nation and sometimes obtained by conquest. With the advent of the oil-burning ship, oil bunkering stations have become equally essential.

**Coalition**, a name applied both in national and international politics to an arrangement whereby two parties or nations, usually hitherto opposed in interests or ideas, agree to sink their differences in order to secure some common end. In international politics the name is applied only to temporary alliances for specific purposes. In the countries of Europe, where political parties are numerous, and frequently no one has a working majority in the legislative body, the coalition is a politic expedient constantly resorted to.

**Coal Mining** comprises the processes whereby coal is obtained from its natural localities beneath the surface of the earth, and the various subsequent operations by which it is prepared for use. The first step in the mining of coal is the location of workable deposits by prospecting. The existence of coal-bearing strata having been ascertained from knowledge of the geological formation of the district, the thickness of the coal seams, their depth from the surface, and the nature of the coal are determined by means of boring. Estimates of the probable expense of sinking the shafts, and of the relation between

the output and the cost of working the mine, may thus be formed; and information is obtained as to the inclination or 'dip' of the seams, and as to the presence of faults (see DRILLS AND DRILLING).

Workable seams of coal having been located, the next step in their development is to render them accessible to the miner. Occasionally, when surface outcrops occur, the coal can be worked by drifts driven directly into the seam, or in hilly country by tunnels opened through intervening rock measures. This is very common in some parts of the United States. The method most generally employed, however, is the sinking of shafts, which may be utilized not only for the entrance and exit of workers and the transportation to the surface of minerals, but also for ventilation, the pumping of water from the mine, and the transmission of power from the surface to the underground workings.

The number of shafts is governed by the extent of the mine and the proposed output of coal, by the system of ventilation, and by legal provisions. In England at least two shafts for each mine are required by the Coal Mines Regulation Act. In the United States the mining regulations are under the control of each State, and vary considerably. The location of the shafts is determined by the surface contour of the land; the proximity of transportation facilities, as road, railways, and canals, and of facilities for power generation; the character and inclination of the strata to be penetrated; the presence of faults, which are likely to prove a source of danger; and the method to be employed in working the coal. Formerly, only those coal beds lying close to the surface were considered workable; but with the exhaustion of the coal deposits near the surface and with the general improvement in engineering appliances, the depth of shafts has markedly increased.

There are two methods of working mines: (1) The *pillar-and-stall*, *bord-and-pillar*, or *room-and-pillar* method consists in driving roads or stalls through the coal, and connecting them by cross passages leaving pillars of coal in between to support the roof. The advancing end of the 'room,' where the miners are actually working, is called the 'working face.' After a certain area has been worked in this way, the pillars themselves are cut out, the roof of the rooms being in the meantime supported by timbering, which is removed as each section of the mine is completed. This process is known as 'pillar drawing' or 'robbing pillars.' The *room-and-pillar* method is

used very extensively in the United States.

(2) In the *long-wall* method the whole of the coal is extracted as the work proceeds outward from the shaft pillar, a gradually extending face being formed, and the spoil or 'goaf' (called 'gob' in the United States) stacked behind, with communication roads left in it. In 'longwall working back,' roads are first driven to the outside of the mine, and then worked back in a long face toward the shaft, the outer space being entirely filled with gob.

The proper support of underground workings is of the utmost importance, a large percentage of mining accidents being due to falls of roofs and sides in roadways and at the coal faces (see MINING). All coal seams, except those of anthracite, have cleavage planes along which they may be readily split. In the United States, where the room-and-pillar method is very generally used, there are two principal ways of bringing down the coal in the first working—simple blasting without any preliminary operation, known as 'shooting off the solid,' and blasting preceded by undercutting or shearing, so as to expose more than one face of the coal to the action of the explosive. The latter is much the more common method.

For thick seams mechanical cutters are used with advantage, owing to their superior speed of working, increased output of coal, minimum risk of the roof falling, and the fact that their use produces a less proportion of small coal. The two types commonly employed in the United States are the pick or drill, which delivers a rapid succession of sharp blows with a long chisel-like pick, and the chain cutter, in which a series of cutting teeth are mounted on an endless chain rotated by a motor. Either compressed air or electricity may be used for the motive power (see COMPRESSED-AIR MOTORS; ELECTRICAL MACHINERY; PNEUMATIC TOOLS). Machine mining has had a remarkable development in the United States. Until recent years the coal, after undercutting and blasting, was loaded into the mine cars by hand in all cases. Later, however, loading machines have come into use in many mines. These are operated by electricity, and load the blasted coal directly into the cars.

The use of specially designed locomotives for hauling coal underground is common in American and Continental mines where the roadway is flat or the inclination slight. Compressed air, electric, and internal combustion locomotives are employed. In American

mines, electric locomotives are the usual variety. In coal seams which are so thin that the cars cannot be taken along the face to be filled, mechanical conveyors are employed to transfer the coal to the haulage road. On arrival at the shaft bottom the loaded cars are run into a 'cage' with from one to five 'decks' or stages, each of which holds one or more cars.

Sorting the coal as mined is not always carried out. Sometimes the coal is sold as mined, under the designation 'run-of-mine.' When the coal is to be sold for domestic fuel, however, preparation is necessary, and it is common even when such is not the case. If the coal is to be prepared, the cars, as they leave the cage at the top of the shaft, are run on to tracks so graded that they are carried by their own weight, first over the weighing machine, and then into 'tipples,' where they are emptied. From the tipples the empty cars descend to a creeper or endless chain, by which they are again raised to the level of the cages. The tipples for emptying the cars are designed chiefly on the rotary principle, the car being turned through either a whole circle or half circle, and the contents falling over screens provided with openings of different sizes, by means of which the coal is sorted. The coal then passes on to travelling belts, where it is further sorted by hand as to quality, and from these is delivered by a lowering arm into railroad cars beneath.

Impure air in mines is due to the exhalations of the men and animals employed; to burning lamps and candles; to the gases arising from the coal and other components of the coal-bearing strata, or produced by the use of explosives—notably fire damp, choke damp, and carbon monoxide; to underground fires; to decaying timber; to the chemical absorption of oxygen; and to the introduction of foreign substances by blasting. The ventilation of a mine is effected by passing a current of fresh air from the downcast shaft along a system of 'intake' roads, and thence back along a second system of 'return' roads to the upcast shaft, through which the vitiated air rises to the surface. Fire damp, choke damp, carbon monoxide, and coal dust are especially dangerous factors in coal mining, and numerous devices are employed for detecting their presence and guarding against their disastrous effects. Some of these are treated in the articles on SAFETY LAMPS.

The quantity of water met with in mines varies with the depth of the workings—deeper



mines, with a well-lined shaft, being less liable to an inflow of water than are shallow workings. Pumping is particularly vital in the anthracite mines of the United States. When the excess of water is small, a common method is to draw it up the shaft in tanks, which may either form part of the cage or be substituted for it. A system of siphoning is also occasionally used; but the best and most common method of ridding mines of water is by continuous pumping. (See PUMPS.) The *transmission of power* to the mine workings is accomplished by various methods, including: steam or compressed air in pipes, water under pressure in pipes, electricity along metal conductors, and by means of ropes or of rods of wood or iron. With all of these methods, however, steam is almost always the initial source of power, being used to generate the electricity, compress the air or water, and operate the ropes and rods.

Electricity as a motive power in mines has increased rapidly in recent years, and is now extensively utilized for haulage, pumping, ventilation, coal cutting, conveying, and lighting. It is now the principal motive power used in American coal mines. Its chief disadvantage is the possibility of fire due to sparking at the motor or to short circuiting. The coal industry is one of the major industries of the United States, involving a number of miners varying seasonally and according to economic conditions from 500,000 to 900,000. It is difficult to estimate even approximately the amount of investment involved or the annual returns. From an economic standpoint there are two separate industries, the anthracite industry and the bituminous industry.

Anthracite or 'hard' coal is produced only in a comparatively small area in the eastern part of Pennsylvania. The supply will be mined out in a comparatively short time (estimated at 150 years), and the costs of mining are increasing. The 1940 production was 50,024,000 tons. The greater part of the unmined supply of anthracite coal is in the hands of eight large producers, although a part of that supply is owned by so-called 'independent' companies. Bituminous or 'soft' coal, on the other hand, is found in 36 States, and the supply is virtually unlimited. It is estimated that there is enough unmined bituminous coal within the continental limits of the United States to last 3,000 to 4,000 years. Especially large reserves, which are practically untouched, exist in the Rocky Mountain region. The 1940 production was 450,000,000

tons. The bituminous industry, as distinguished from the anthracite industry, is an intensely competitive one, there being over 6,000 independent producers. The largest single company produces less than 3 per cent. of the total annual tonnage. Bituminous coal is used for a wide variety of purposes, both domestic and industrial, a very important use being for railroad fuel. The output of bituminous coal is consumed approximately in the following percentages: railroads, 28 per cent.; miscellaneous industrial uses, 25 per cent.; manufacture of coke, 15 per cent.; domestic uses, 10 per cent.; manufacture of iron and steel, 7 per cent.; public utilities, 7 per cent.; export coal, 4 per cent.; bunker coal, 2 per cent.; used at the mines, 2 per cent.

The outstanding feature of the coal industry in the United States, from an economic point of view, is the labor situation. The labor in a considerable part of the industry is controlled by a national labor organization, the United Mine Workers of America. The bituminous industry, as a whole, is about 60 per cent. organized, although in some fields organization is quite complete. The union fields operate under wage contracts with the United Mine Workers, while the non-union fields do not. The existence of the non-union fields has been a handicap to the success of strikes of the United Mine Workers in the union fields, and that organization has made several attempts to organize the non-union portion of the industry. In several cases, these attempts have been accompanied by violence and bloodshed. This was the case in Colorado in 1914, in West Virginia in 1912, 1917, 1919, and 1922, in Alabama in 1920 and 1921, in Utah and Northeastern Kentucky in 1922 and 1939, and in Maryland in 1923. In no case were the attempts to organize the non-union fields permanently successful, and the approximate ratio of 60 per cent. union and 40 per cent. non-union has persisted for some time.

The economic situation is a serious one, with many producers operating at a loss, and bankruptcies and reorganizations frequent. This is largely the result of the fact that the bituminous industry is seriously overdeveloped. The normal annual demand for coal is approximately 500,000,000 tons, while the capacity of the bituminous mines is well over 800,000,000 tons. A corollary to the overdevelopment of the bituminous industry is the fact that it is considerably overmanned. It is stated by the U. S. Coal Commission that there are at least 200,000 more bituminous miners than are necessary. As a result, there

is a large amount of unemployment and part-time employment in the industry. This will continue until economic pressure forces the superfluous miners into other occupations. This has been one of the serious problems of the Franklin D. Roosevelt administration.

The coal industry of the British Isles employs approximately 1,230,000 miners and represents an investment of some \$700,000,000, exclusive of the value of coal reserves. The industry is a vital one to the economic life of the British Isles, and especially to its export trade, since coal forms 80 per cent. of all out-bound cargoes. The coal industry of Great Britain is almost completely unionized. There has been a considerable amount of agitation in Great Britain for the nationalization of coal mines, and this is one of the planks in the platform of the British Labor Party. The coal reserves of the world are estimated at a total of 8,154,322,500,000 tons distributed as follows: North and South America, 5,627,823,500,000 tons; Asia, 1,410,487,600,000 tons; Europe, 864,412,600,000 tons; Oceania, 187,842,900,000 tons; Africa, 63,755,900 tons. The United States, Great Britain, Germany, France, Belgium, Russia, Austria, and Hungary all have large supplies of coal, easily worked and suitable for manufacturing and engineering purposes, and these have been conducive to the rapid advance of their industries and commerce. America's coal fields are so enormous that the question of reserves is seldom raised. China also has vast coal resources (estimated at 1,097,436,100,000 short tons) that have been practically untouched. In many European countries, however, the large production is rapidly depleting the reserves, and the possibility of ultimate exhaustion has become a matter for serious consideration.

But while coal consumption is rapidly increasing, developments are taking place in the coal industry which tend to economy of consumption, which will undoubtedly make the present coal supply last longer than it otherwise would. Waste in mining operations is being minimized by improved methods; much of the dross and broken material incident to coal mining, which formerly went to waste, is now used for the manufacture of briquettes (see BRIQUETTING); with the aid of the gas producer, coal is made to furnish greatly increased driving power, and large quantities of low-grade coal and lignite are utilized that were formerly wasted.

It is believed that coal can be worked to depths of at least 4,000 feet (there are coal

mines in Belgium somewhat deeper than this); but owing to the high temperature and the great pressure of the overlying strata, this can be done only at great cost for ventilation and timbering. Improved methods of sinking and working, and the increased use of coal-cutting machinery and electricity, may to some extent facilitate the extraction of the deeper-lying coal. See COAL; MINING; MINING LAW. Consult *Annual Reports* of the U. S. Geological Survey; *Mineral Resources of the United States* (issued annually by the U. S. Geological Survey).

**Coal Oil**, another name for **Petroleum**.

**Coal Tar, Gas Tar, or Tar**. The liquid that condenses when the volatile products of the distillation of soft coal are cooled separates into two layers: an upper aqueous portion, containing ammonia in solution, and from which the ammonium salts of commerce are obtained; and a lower heavy black oil, which is Coal Tar. Coal tar contains varying quantities of the following substances: *hydrocarbons*, the most important of which are Benzene, Toluene, the Xylenes, Naphthalene, and Anthracene; *phenols*, the chief of which are the phenol which is popularly termed Carbollic Acid, and cresols; *basic substances*, including small quantities of Aniline, Pyridine, Quinoline, and other bodies.

The several constituents of coal tar are first partially separated by *fractional distillation*. (See DISTILLATION.) The distillate is collected in separate fractions, according to the temperature, specific gravity, and various other indications. Each fraction is then further separated and the substances thus obtained are the starting points of the coal-tar dyes, synthetic medicines, high explosives, synthetic perfumes, and many other products. See TAR; GAS MANUFACTURE; BENZENE; ANILINE; ANTHRACENE; COAL-TAR DYES; DYEING; PERFUMERY. Consult Wagner's *Coal Gas Residuals* (2d ed. 1918); Warne's *Coal Tar Distillation* (1923); Spielmann's *The Constituents of Coal Tar* (1924).

**Coal-Tar Dyes**, dyes manufactured from products obtained in the distillation of coal tar. With the exception of anthracene, from which artificial alizarin is prepared, the raw materials chiefly used are benzene or naphtha, phenol or carbollic acid, and naphthalene. These may be arranged in three divisions: *Aniline Dyes*, compound amines, with bodies of the nature of bases; *Phenol Dyes*, derivatives of phenol (carbollic acid) and similar chemical bodies, which are salts of variously substituted carbinols; and *Azo Dyes*, bodies

containing the azo-group, or several of such groups, and distinguished as monazo- and diazo-dyes. The coal-tar color industry dates from the discovery by Perkin, in 1856, of a purple or mauve dye formed by the oxidation of aniline. But although the dye industry was founded in England, its development was carried on chiefly in Germany, and up to the time of the Great War, that country produced three-quarters of the world's supply of coal-tar colors.

The preparation and properties of aniline are described under that head (see ANILINE).

When the hydrogen atoms of benzene are replaced by hydroxyl, OH, bodies called *phenols* are formed. Naphthalene yields most important bodies of this class, called *naphthols*. Some of the principal yellow dyes are nitro compounds of these bodies.

*Picric Acid* is trinitrophenol,  $\text{C}_6\text{H}_3(\text{NO}_2)_3\text{OH}$ . It is sparingly soluble in water, to which it gives an intensely bitter taste, recognizable in fibres which have been dyed with it. The salts crystallize well, are more or less explosive, and are poisonous, as is also the free acid.

*Azo Dyes* are neutral dyes which by reactions with amines or phenols produce coloring bodies. The dyes of this class can be obtained by a reducing action on nitro compounds, or by the interaction of nitrous acid (nitrites and weak mineral acids) upon aromatic amines, which gives the chromogen or chromophore azo group,  $-\text{N}=\text{N}-$ , as the link between at least two cyclic groups. Most of these dyes from benzene and the lower members of its series are yellow or brown; but when hydrocarbons with more carbon atoms are used, such as cymol and naphthalene, reds and blues are produced.

*Oxyazo Dyes* are prepared from phenols, and have become the most important of the coal-tar colors. They are nearly all sulphonic acid compounds, and are used in the form of sodium salts of these acids. The yellow and orange colors are sold as *Tropæolins*; fast red, *Roccellin*; claret red, *Bordeaux*; scarlets, *Biebrich*, *Crocein*, etc. The benzidine and allied colors belong to the tetrazo group of the oxyazo dyes, and have the valuable property of dyeing cotton without a mordant. Almost any shade of blue, green, yellow, and red can be obtained from them.

*Anthracene Dyes* comprise a small group, produced from anthraquinone, a derivative of coal-tar anthracene. They are artificial productions of the natural colors of madder, and have almost completely taken the place of the natural product. Alizarin as sold contains

three coloring matters—*alizarin*, blue; *anthrapurpurin*, red; and *flavopurpurin*, orange. They may all be produced separately from the different sulphonc acids. Their properties as dyes are similar. Natural *indigo* has been largely supplanted by artificial blues prepared from coal-tar derivatives (see INDIGO). See DYEING. Consult Fay's *Chemistry of Coal Tar Dyes* (1911).

**Coal Tit** (*Parus ater*), a common European titmouse, black with a glossy blue-black head with white spots. See TIT.

**Coan, Titus** (1801-82), American missionary, was born in Killingsworth, Conn. In 1835 he inaugurated missionary work in Hilo, Hawaii, where he spent the remainder of his life. He also organized missions in the Marquesas and Gilbert Islands. He was the author of *Adventures in Patagonia* (1880), etc. Consult *Memorial*, by his wife.

**Coan, Titus Munson** (1836-1921), American author, son of Titus Coan, was born in Hilo, Hawaii. He served in the hospitals of the Federal Army from 1861 to 1863; from 1863 to 1865 was assistant surgeon with Admiral Farragut's squadron, and was in the Battle of Mobile Bay. In 1871-3 he was literary editor of the New York *Independent*; and in 1880 he founded the New York Bureau of Revision, of which he was long a director. His publications include: *Hawaiian Ethnography* (1899); and essays on literary criticism and poems.

**Coanza, or Koanza**, river, Portuguese West Africa, rises south of the Bihé plateau, flows northwest and west, and falls into the Atlantic Ocean 30 miles south of St. Paul de Loanda. It is navigable for small vessels as far as the Livingstone Falls, 120 miles from its mouth. Length, 500 miles.

**Coast.** The coast may be defined as the belt of land, partly above, partly below the normal level of the ocean, which at the present time is subjected to the action of its waters. The margin of the ocean is never constant, but swells and sinks with changes of atmospheric pressure, thus influencing a narrow strip of land, called the *coast line* or *shore line*. The ocean also rises and falls in tides, which determine a second and wider strip of land—the *shore*. A third strip of land, the *coastal region*, or *coastal belt*, arises from more potent and more intermittent causes, which take the form of climatic and natural disturbances, as exemplified in earthquakes and storms, the concerted action of these often profoundly altering the nature of the coast line. The terms *sunken*, *submerged*, or *drowned coast* are used

for the region where a positive sea-level movement has taken place, and *raised* or *emerged* coast where a negative movement has occurred.

In *sunken* or *drowned coasts* the characteristics are determined by the original sub-aerial configuration, and the phase of degradation due to the nature and duration of subsequent marine action. The outline of the coast depends on the nature of the valleys and heights of the drowned land. In regions which have been glaciated, and have U-shaped valleys and rounded ridges, a new type of coast line is found—the fjord coast, where the inlets are steep sided, do not narrow much, and have irregular floors.

The *raised* or *emerged coasts* are regular, with gently waving lines. They are usually sandy, and tend to be fringed with dunes. One of the most common characteristics of this emergent coast is the presence of lagoons, which are usually parallel to the shore, and separated from it by sand spits formed by currents, due to wind, tides, or rivers. Some coasts are due to the past and present activity of plants such as mangrove, which forms great swamps on many coasts of the hot belt, and animals, such as the coral polyp, whose skeletons, under the influence of wind and wave, form the coasts of many islands and of reefs, such as the Great Barrier Reef of Australia. (See CORALS.)

The minor forms of the shore line are most varied in the case of drowned coasts, where the waves act directly on the rocks. Here composition and structure play their part in determining the details of the configuration. A homogeneous rock tends to form a regular coast. Where the rocks vary in composition, the more easily eroded are worn into inlets, between which the harder rocks project as headlands. The coast, as the meeting place of two fundamentally different worlds—of solid land and liquid sea—at once imposes a limit on the inhabitants of each, and adds to the resources of both. The littoral floras and faunas of land and sea are peculiar and rich, but only a small number of organisms find it possible to exist both on land and in water. From the human standpoint, the coasts may be divided into harbored and harborless; permitting easy or difficult access from the sea and from land; shallow and deep; rich or poor in fishing grounds. Territorial waters, usually three nautical miles, are measured from the low-water mark of the adjacent coast. See GEOGRAPHICAL DISTRIBUTION; SEASHORE; TIDES.

**Coast and Geodetic Survey, U. S., a**

bureau of the Department of Commerce whose functions are to survey the coast of the United States and coasts under the jurisdiction thereof; to publish charts covering said coasts; and to conduct allied scientific investigations, involving physical hydrography, terrestrial magnetism, the study of gravity, and similar research. The beginnings of the Coast Survey may be found in the Act of Congress of Feb. 10, 1807, authorizing a survey of the coast of the United States, and appropriating \$50,000 for that purpose. For years later the initial preparations were made; and on Aug. 6, 1816, field work was begun in the vicinity of New York City. During the period prior to the Civil War, hydrographic surveys were extended over large portions of the Atlantic and Pacific Coast. In 1871 the scope of the Survey was considerably enlarged, and the extension of the triangulation into the interior of the country was authorized. In 1878 its title was changed from Coast Survey to Coast and Geodetic Survey. In 1903, on the creation of the Department of Commerce, the Survey was transferred thereto from the Treasury Department.

Besides the main office of the Survey at Washington, there are sub-offices at New York, Seattle, San Francisco, and Manila. The Survey publishes 645 charts and tide tables for all the principal and many of the minor ports of the world; a weekly publication known as *Notice to Mariners* (issued jointly with the Bureau of Lighthouses), which contains notes of changes along the coast of interest to seamen; and *The Coast Pilot*, containing detailed sailing directions for navigable waters along the coast of the United States, descriptions of dangers to navigation, and other information of special value to mariners.

**Coast Artillery, or Fortress Artillery,** to use the term applied in some foreign countries, includes guns of all calibres and mortars, mounted on carriages permanently emplaced or fixed in position. The carriages are designed to support the guns during firing, and not to transport them as in the field artillery. In the United States, these guns, as the term implies, are permanently emplaced in time of peace for the defence of the seacoasts, and constitute the only system of permanent fortification.

For purposes of technical artillery administration and instruction, the coast artillery of the continental United States is organized into three districts. The North Atlantic Coast Artillery District includes all the seacoast forts from Maine to New York Harbor inclusive; the South Atlantic District, all those from

Delaware Bay to Texas inclusive; and the Pacific District, all those from California to the State of Washington inclusive. In the insular possessions the seacoast forts in the Philippine Islands, Hawaiian Islands, and Panama are organized into separate coast defences. The *Coast Artillery Corps* is that part of the U. S. Army which is engaged in serving the seacoast guns. See COAST DEFENCE.

**Coast Defence.** Every nation having a maritime frontier has commercial relations of more or less importance, depending upon its industrial development. To protect its commerce and guard its territory against invasion from overseas, it must make provision for defending the coasts. National policy determines the character, extent, and purposes of coast defence in its broadest sense, as well as the uses to be made of its constituent elements in time of war. Modern systems of coast defence are founded upon well-recognized principles of strategy, and should be consistent with the national policies. In a way, the coast fortifications of a nation may be said to be the complement of its naval strength, the two together forming a unit.

The defence of the coast line involves the use of both naval and land forces. The *naval forces* include: (1) The active fleet. (2) The portion of the reserve fleet assigned to local defence of important points along the coast. (3) The naval coast patrol, which operates in conjunction with the shore signal stations.

The *land forces* include: (1) The coast artillery troops, who are charged with the care and use of the fixed and movable elements of the seaward and landward defence of the coast fortifications, including guns, mortars, submarine mines, and torpedoes. (2) The coast artillery supports, which consist of small bodies of coast artillery or infantry troops assigned to the defence of the fortifications against attack by small raiding parties, which land near the forts. (3) The coast guard, which consists of troops from the mobile army concentrated at strategic points near the coast. In 1942 Congress created the Women's Reserve of the U. S. Coast Guard, the SPARS.

The first line of defence consists of the active fleet of the navy, which must be free to seek out and destroy its proper objective, the hostile fleet, and must not be tied down to or be divided for the local defence of particular points. The second line of defence may be regarded as the coast fortifications and the accessory or allied defences. With reference to the land forces, the military preparations connected with the defence of the coast line may

be divided into three groups: Constructing, arming, and equipping permanent fortifications, and making provisions for submarine defence in time of peace; constructing, arming, and equipping semi-permanent fortifications and field works for the protection of the permanent fortifications against attack by small raiding parties on the landward side; and the organization and concentration of troops from the mobile or field army to resist the landing of large bodies of troops near cities and fortified harbors, and for the defence of strong, semi-permanent works on interior lines. These troops constitute the coast guard, and are concentrated at strategic points only when war is imminent. In the United States, coast defence dates back to the period shortly following the War of 1812. In 1816 boards of engineer officers were convened for the purpose of considering and reporting upon a system of defences for the seacoast of the United States. The history of modern coast defence in the United States begins with the creation of the Gun Foundry Board in 1884, which was succeeded by the so-called Endicott Board in 1886. Until 1880 the custom had been to assemble large numbers of guns in massive stone or brick forts; but the bombardment of the forts at Alexandria, Egypt, in 1881 by the British fleet drew attention to the value of concealment and dispersion of the guns ashore in reducing the effect of the fire of a fleet. The changed conditions since 1886, due to the development of guns, smokeless powder, and all kinds of munitions of war, made it advisable to revise the system of the Endicott Board, and the National Coast Defence Board, composed of distinguished army and naval officers, under the presidency of W. H. Taft, then Secretary of War, was convened. This board, known as the Taft Board, submitted its report early in 1906. The Taft Board recommended the fortification of 29 ports in the United States (7 more than under the plans of the Endicott Board), 6 in the insular possessions, and 2 in the Canal Zone. Since the outset of World War II the airplane has played an increasingly important part in coast defence activities. See FORTIFICATION; ARTILLERY; GUNS; SEA POWER. Consult *Report* of the National Coast Defence Board (1906); *Drill Regulations*, Coast Artillery (1914); *Journal U. S. Artillery*; *Reports* of the Chief of Coast Artillery.

**Coast Guard Academy, U. S.** See **Coast Guard Service.**

**Coast Guard Service, U. S.,** a govern-

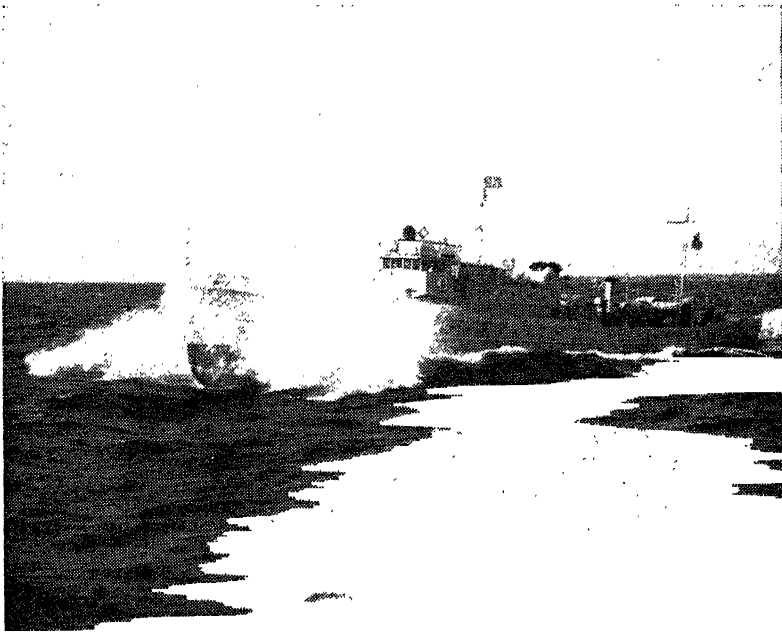
ment service under the jurisdiction of the Treasury Department, created by the Act approved Jan. 28, 1915, whereby the Revenue Cutter and Life Saving Services of the United States were merged into one organization, to be known thereafter as the Coast Guard.

The Revenue Cutter Service was originally established in 1790, at the second session of the First Congress, as the result of the need for the services of a coast patrol for the enforcement of the customs laws and an organized armed force for the protection of the seacoast. In 1871 the Service was reorganized and a definite life-saving system was inaugu-

of national defense it aids the Navy in patrolling harbors and inspecting foreign ships. It also organizes yachts and small craft and trains their crews for duty in case of national emergency.

**Coastlands** (German *Küstenland*), a comprehensive name for the former Austrian crown lands Gorz and Gradisca, and Istria, and the town of Trieste. This territory came into Italian possession following the Great War.

**Coast Pilot** is a pilot licensed to conduct vessels along a coast. Upon reaching a bay or harbor, a vessel is often put under the conduct



U. S. Coast Guard, *Thetis*.

rated and placed under its administration. This was constituted a separate organization, known as the Life Saving Service in 1878, and was so maintained until the two were again combined in 1915.

The Coast Guard is essentially an emergency service and may be called upon for any special work of a maritime nature for which no other vessels are provided. It operates in the North Atlantic an international ice patrol, which dates from the sinking of the *Titanic* in 1912, and provides a lighthouse service of great value to ships and trans-ocean bomber flights. In the administration

of a local pilot, who is expected to know his part of the coast thoroughly and to be familiar with all the soundings, currents, beacons, buoys, etc. See **PILOT**.

**Coast Ranges**, a series of mountain ranges near the Pacific Coast, stretching through British Columbia, Washington, Oregon, and California. The British Columbia Coast Range reaches an average height of about 6,000 ft. In Northwest Washington the system is represented by the Olympic group, which is extremely rugged, its highest peak being Mount Olympus (8,150 ft.). To the south the ranges diminish greatly in altitude,

but in Northern California they rise again to considerable altitudes. South of San Francisco Bay they are low, in no place reaching 5,000 ft. in height. Near Los Angeles these ranges are continued by others which stretch into the interior, where they reach great altitudes. See NORTH AMERICA.

**Coast Survey.** See **Coast and Geodetic Survey.**

**Coastwise Trade, or Coasting Trade,** the maritime commerce between ports of the same country, limited by most nations to ships of domestic ownership. Since 1854 Great Britain has allowed vessels of any nationality to carry passengers and goods from one port in Britain to another. In *Canada* the coastwise trade is restricted to British ships. The coasting trade of the United States, because of the length of sea coast, exceeds that of any other nation. The Atlantic and Gulf trade includes the shipping of grain and manufactured goods to the South, and of cotton, sugar, rice, and lumber from the South. The Pacific trade deals principally with lumber, grain, and petroleum; that of the Great Lakes with minerals, grain, and lumber. Traffic between the Atlantic and the Pacific Coast is carried on largely by way of the Panama Canal.

Section 4347 of the Revised Statutes, as amended by section 1 of the Act of Feb. 17, 1898, in part provides: 'No merchandise shall be transported by water, under penalty of forfeiture thereof, from one port of the United States to another port of the United States, either directly or *via* a foreign port, or for any part of the voyage, in any other vessel than a vessel of the United States.' 'No foreign vessel shall transport passengers between ports or places in the United States, either directly or by way of a foreign port, under a penalty of \$200 for each passenger so transported and landed.' The coastwise regulations were extended to Alaska in 1867, to Hawaii in 1898, to Porto Rico in 1899, and to the Philippines in 1906 (but removed in 1908). The Panama Canal Act originally provided that no canal tolls should be levied on 'vessels engaged exclusively in the coastwise trade of the United States'; but this exemption was protested by Great Britain, and was later repealed by Congress. See PANAMA CANAL; SHIPPING, MERCHANT; SUBSIDIES. Consult *Annual Reports* of the U. S. Commissioner of Navigation.

**Coati, or Coati Mundi** (*Nasua*), a small brown mammal allied to the raccoon, of which two species are found in Mexico, Central and

South America, and the Southern United States. They are often tamed.

**Coat of Arms.** See **Arms, Coat of; Heraldry.**

**Coat of Mail.** See **Armor.**

**Coatzacoalcas, or Snake,** river, Mexico, rises in the Sierra Madre, Tehuantepec Isthmus, and after a northerly course falls into Campeachy Bay, 130 m. s.e. of Vera Cruz. It is about 150 m. long, and is navigable for large vessels for about 30 m. from its mouth.

**Cobalt, Co,** 58.97, is a metallic element discovered by Brandt in 1735, the ores of which are sparingly distributed. It most frequently occurs as *smaltite*,  $\text{CoAs}_2$ ; *cobaltite* or *cobalt glance*,  $\text{CoSAs}$ ; and *linnæite*, *wad*, or *cobalt bloom*,  $\text{Co}_2\text{Si}$ . Its minerals are found chiefly in the Erzgebirge Mountains, Sweden, Norway, Chile, in silver ores in the Timiskaming district of Ontario, at present the leading sources of supply, in Oregon (as *garnierite*), and in New Caledonia. The metal itself is of a gray color with a reddish tinge, brittle, hard, and very magnetic. Specific gravity, 8.5 to 8.9. Melting point,  $1,467^\circ \text{C}$ .

Many of the compounds of cobalt are valued on account of the brilliance and permanence of their colors. The protoxide of cobalt,  $\text{CoO}$ , is employed in the form of *smalt* in the production of the blue colors in porcelain, pottery, glass, encaustic tiles, fresco painting, etc.; and it is the principal ingredient in *Old Sevres Blue*, *Thenard's Blue*, etc. The chloride of cobalt, dissolved in water, may be employed as a sympathetic ink.

**Cobalt,** mining town, Ontario province, Canada, on Cobalt Lake, in the Nipissing district. Cobalt is the center of one of the richest silver-producing districts in the world, dating from 1903, when the first notable discovery of ore was made; p. 5,638.

**Cobán,** capital of department of Vera Paz, Guatemala, Central America, in the finest coffee district of the republic. Chalk is mined and made into crayons. Alt. 4,050 ft.; p. 30,770.

**Cobb, Henry Ives** (1859-1931), American architect, born Brookline, Mass. In 1881 he removed to Chicago, where he designed the new Federal Building, the Opera House, and the University of Chicago. He was also the architect of the American University in Washington, and many other public and private buildings. He served the U. S. Government as special architect from 1893 to 1903, and was a member of the National Board of Architects for the Columbian Exposition (1893).

**Cobb, Howell** (1815-68), American public official, was born in Jefferson co., Ga. He was governor of Georgia (1851-3); and secretary of the Treasury in the Cabinet of President Buchanan (1857-60). An ardent advocate of slavery, he resigned from the Cabinet to become president of the congress that adopted the Confederate Constitution.

**Cobb, Irvin Shrewsbury** (1876-1944), American author and humorist; born in Paducah, Ky. He served as a special writer on the staff of *The Evening Sun* (1904-5) and of *The Evening World and Sunday World* (1905-11). In 1911 he became staff contributor to *The Saturday Evening Post*, and was travelling in Europe for that periodical when the great war of 1914 broke out. His published works include two volumes of humor, *Cobb's Anatomy* (1912) and *Cobb's Bill of Fare* (1913); *Europe Revised* (1914) and *The Paths of Glory* (1915), based on his European experiences; *All Aboard* (1928).

**Cobb, John R.** (1901- ), English sportsman. In 1938, at Bonneville, Utah, he established world automobile speed record, which was beaten the following day by Capt. Eyston. On August 23, 1939, at same place, Cobb with his "Railton Red Lion" made a new world record 368.85 m.p.h.

**Cobbett, William** (1762-1835), English political writer and reformer, was born in Farnham, Surrey. In 1802 he started his famous *Weekly Political Register*. But Tory first, it altered its politics in 1804, till it became the determined opponent of the government and the uncompromising champion of Radicalism. In 1817 Cobbett came to the United States on a second visit, to escape prosecution, and lived on Long Island, N. Y., but returned to England two years afterward, taking with him the body of Tom Paine, which he had caused to be exhumed. A vigorous and original writer, Cobbett 'might be said to have the cleverness of Swift, the naturalness of Defoe, and the picturesque satirical description of Mandeville' (Hazlitt). His books include: *A Year's Residence in the United States of America* (1818); *Rural Rides* (1830), his best book; and a great number of political pamphlets and other writings. Consult *Life* by himself; *Lives* by his son, and by R. Huish, Edward Smith, and R. Waters; E. J. Carlyle's *Study* (1904); Melville's *Life and Letters* (1913).

**Cobden, Richard** (1804-65), English statesman, 'the Apostle of Free Trade,' was born in Heyshott, Sussex. In 1835 he visited the United States, and in 1836-7 travelled in

Turkey, Greece, and Egypt. The result of his travels appeared in two pamphlets, *England, Ireland, and America* (1835), and *Russia* (1836). The dominating thought of Cobden's political writings was the necessity of free economic intercourse between nations, and, as a consequence, the futility of the old ideas of the balance of power, and the folly of war. His first public appearances were identified with the crusade against the Corn Laws. After seven years of hard work on the part of the league, the Corn Laws were repealed (see CORN LAWS).

He started a propaganda on the Continent where, among the leading statesmen, historians, and economists, he endeavored to spread true views on social progress, economic reform, and international relations. During his absence he was elected both for Stockport and the West Riding of Yorkshires; he chose the latter constituency, which he continued to represent till 1857. Cobden began to agitate in and out of Parliament in favor of a peace policy, the reduction of armaments, and the acceptance of arbitration to settle international disputes. In reconstructing his Cabinet, Lord Palmerston offered him a seat, but Cobden declined. As Her Majesty's plenipotentiary (1859-60) he arranged and concluded a treaty of commerce with France. He spoke out strongly in favor of the North during the American Civil War, and in 1864 strenuously opposed intervention in favor of Denmark. He was the first political thinker who grasped in its entirety, and endeavored to translate into legislation, the comprehensive theory of civilization that not only the economic but the universal interests of nations are not antagonistic, but harmonious. Consult *Speeches* (ed. John Bright and Thorold Rogers); Morley's *Life* (new ed. 1908); Ashworth's *Recollections*; MacCunn's *Six Radical Thinkers* (1910).

**Cobham, Lord.** See Oldcastle, Sir John.

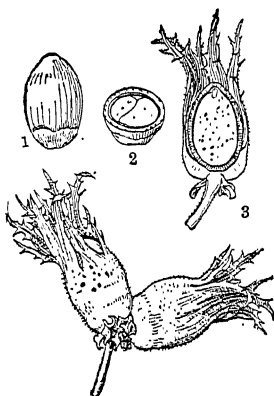
**Coblentz.** See Koblenz.

**Cobnut**, a name given to some of the largest and finest cultivated varieties of the Hazelnut. The species most commonly referred to is *Corylus tubulosa*, or great cob. In the West Indies the name given to the fruit of *Omphalea triandra*, a tree of the natural order Euphorbiaceæ. Its white juice turns black on drying, and in Guiana is used as ink.

**Cobra**, or **Cobra de (da, di) Capello** ('hooded snake'), a widely distributed poisonous snake (*Naja tripudians*), occurring



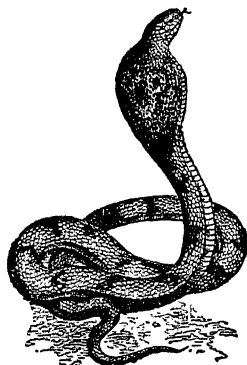
over the whole of Southern Asia, especially in India, and extending to the Malay Archipelago. It belongs to the sub-order of venomous Colubrine snakes (Proteroglypha), in which the fangs borne on the upper jaw are



*Cobnuts (Corylus tubulosa).*

1, Nut; 2, 3, Sections of Nut.

not perforated by a complete canal, but possess simply an anterior groove down which the poison trickles. The cobra is a large snake, 5 ft. or more in length; the color varies considerably from pale yellow to dark olive; one variety has spectacle-like black markings on its neck. By the dilatation of the anterior ribs during excitement the neck



*Cobra.*

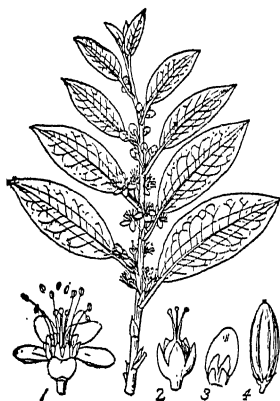
can be distended so as to produce a hood-like appearance. Though essentially land animals, and fond of concealing themselves among old masonry, stone heaps, and the like, the cobras can swim and climb with ease. The bite of the cobra is as usual accom-

panied by the compression of one of the salivary glands modified as a poison bag. The secretion trickles down the grooves of the fangs, and entering the wound produces rapid nervous paralysis, from which recovery is extremely rare. To the same genus belong the hooded cobra or asp of Africa (*Naja haje*), and the large and very dangerous Hamadryad, King Cobra (*Naja bungarus*) or Krait of India, Southern China, etc.

**Coburg**, town, Germany, one of the alternate capitals of the duchy of Saxe-Coburg-Gotha, at the southern foot of the Thuringian Forest; 33 m. by rail n.e. of Bamberg. Immediately opposite to the Ducal Castle is the Court Garden, on the slope of a hill, at the summit of which is the fortress, 525 ft. above the town. It is now converted into a museum of art and antiquities. For some little time in 1530 it was Luther's refuge, and successfully defied Wallenstein's attacks in 1632; p. 24,701.

**Coburg Peninsula** (50 m. e. to w. and 20 m. n. to s.), the most northerly part of Australia.

**Coca**, the dried leaves of a South American shrub, *Erythroxylon Coca*, which grows from three to six ft. high, and is cultivated



*Coca.*

1, Flower; 2, Calyx and pistil;  
3, petal; 4, fruit.

not only in South America, but also in Ceylon, Java, and India. The lanceolate leaves have a very pronounced midrib, a faintly aromatic and bitter taste, and furnish an important narcotic and stimulant. Coca has been in use from a very remote period among the Indians of South America, and was extensively cultivated before the Spanish Con-

quest. In soothing effect it resembles tobacco, but its influence is much more marked. It greatly lessens the desire for ordinary food, and at the same time permits of much more sustained exertion, even without sleep. Habitually chewed, the leaves ruin body and mind. The chief value of coca consists in the alkaloid *Cocaine*.

**Cocaine**, is an alkaloid extracted from the leaves of the *Erythroxylon Coca* (see *Coca*), a shrub cultivated in the tropics of both hemispheres. It was discovered by Neumann in 1860, and introduced into surgical practice by Koller in 1884. The preparations of coca found in the U. S. Pharmacopœia are: coca, the dried leaves; the fluid extract; cocaine; hydrochlorate of cocaine; and oleate of cocaine.

Hydrochlorate of Cocaine ( $C_{17}H_{21}NO_4HCl$ ) is used hypodermically in solution, in doses of one-fifth grain to one grain, or is applied to mucous membranes. Externally applied to the skin, cocaine has little effect. Applied to mucous membranes in the form of a solution of the hydrochloride, it produces first a slight tingling, and afterward numbness and complete local anæsthesia, lasting for about 10 minutes. Cocaine is much used in operations on the eyes, nose, and lips, for application to the tonsils and throat, to reduce their sensibility temporarily, to control hemorrhage, and for diagnostic purposes. When administered hypodermically, it produces local anæsthesia, and is thus very useful for certain minor operations. There are numerous cocaine derivatives, among which may be mentioned *Eucaïne*, *Holocaine*, *Novocaine*, *Stovaine*, and *Tropacocaine*. Several of these have proved valuable substitutes in spinal anæsthesia. (See *ANÆSTHESIA*.)

Administered by the mouth, cocaine is a nerve stimulant, exciting respiration and circulation, removing the sense of fatigue, stimulating to muscular and mental effort, and deadening the sense of hunger, although not affording any nutriment. The dangers of cocaine differ according to the different methods of administration. The stimulating effect which it produces on the brain tends to the formation of the cocaine habit—as serious an addiction as morphinism or alcoholism. The suppression of the improper use of narcotics comes within the activities of the Opium Committee of the League of Nations. In 1931 a conference on limitation of manufacture of drugs was held in Geneva, but the resulting convention has been ratified by only 6 out

of the 25 countries whose signatures are needed to put it in force. See *DRUG HABITS*; *EUCAINE*; *HOLOCAINE*.

**Cocanada**, seaport in Godavari district, Madras, India; 86 m. s.w. of Vizagapatam. It exports cotton, rice, sugar, and cigars; p. 50,000.

**Coca Wine** (*Vinum cocæ*), a wine used for stimulating purposes, consisting of about one part of coca to eight parts of sherry.

**Cocceius, Johannes**, originally **Koch** or **Koken** (1603-69), Dutch Hebraist and theologian, was born in Bremen. He developed the 'federal' or 'covenant' system of theology, an 'important attempt . . . to do justice to the historical development of revelation.' His followers were known as the *Cocceians*.

**Cocceji, Heinrich von** (1644-1719), German jurist, was born in Bremen. His *Juris Publici Prudentia* (1695) was long the text book in German civil law. His son, **SAMUEL** (1679-1755) rose from professor in Frankfurt-on-the-Oder to be Frederick the Great's chancellor (1747). His chief work was the reformation of the Prussian administration of justice. He wrote *Novum Systema Jurisprudentiæ* (1744-52).

**Coccidæ, Coccus Insects**, or **Scale Insects**, a genus of insects of the order Hemiptera, including many forms very injurious to plants, and a few others which have come to be of use to man. As general characteristics may be noted the beaded feelers, the general absence of wings in the female, the degeneration of suctorial proboscis and posterior wings in the male, and the peculiar history of both sexes. In any greenhouse some one or other of the plants will show green or brown 'scales' on the leaves or branches. These are female coccids, the scale being a protective shield, formed of the cast skin together with excreted matter. In other cases the body may be covered with a white powder: such coccids are called *Mealy Bugs*. In still other cases the insects secrete a hard shiny substance, surrounding the whole body; these form the '*Ground Pearls*' of many countries, and are members of the genus *Margarodes*. In addition to their economic importance as destructive insects, coccids yield various useful products. The honeydew formed by *Gossyparia mannifera* is eaten by the Arabs, and is believed to be the manna of Exodus (see *MANNA*). *Lac* is produced by an Indian coccid, *Cochineal* by an American one, *Wax* by various forms. See *INSECTS*.

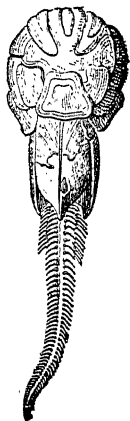
**Coccidia**, organisms related to those which

cause malaria, found as cell parasites in most animals. They are Protozoa, and belong to the order known as Sporozoa.

**Coccinella.** See **Lady-bird**.

**Cocco, Coco Root, or Eddoes**, plants of the genus *Xanthosoma* or *Colocasia*, and of the nearly allied genus *Caladium*, of the order Aracæ, widely cultivated in tropical countries for their edible, starchy root stocks. They are sometimes included under the name Yam, but are different from the true yam. See **TARO**.

**Coccosteus**, a remarkable fossil fish characteristic of the Old Red Sandstone and Devonian rocks of North America and Europe. It is supposed to belong to the group Dipnoi, and was covered with a shield consisting of hard, bony plates. The tail was naked, and devoid of plates or scales.



*Coccosteus.*

**Cocculus**, a genus of berry-bearing shrubs belonging to the order of Menispermaceæ. *Anamirta paniculata* is a native of the East Indies, and is the source of the very poisonous *Cocculus Indicus*, cocculus berries, or 'fish berries' of commerce. The active ingredient is a bitter, very potent substance known as *Picrotoxin*, which constitutes about one-half per cent. of the weight of the seeds. It is a drug and an intoxicant.

**Coccus Insects.** See **Coccidæ**.

**Coccyx**, the small rudimentary bone at lower end of the spinal column. See **SPINAL COLUMN**.

**Cochabamba**, department of Bolivia. Its chief towns are Cochabamba, Sacaba, Tapacari, and Misques. Area, 23,000 sq. m.; p. 381,000.

**Cochabamba**, capital of Cochabamba department, Bolivia; 130 m. s.e. of La Paz. It contains a cathedral, university, theatre, and other buildings. The town was founded in 1573, and was then called *Oropeza*; p. 35,574.

**Cochem**, town, Rhine province, Prussia, at the junction of the Moselle and the Endert; 25 m. s.w. of Coblenz. The ancient castle of the archbishops of Treves is situated on a hill to the south; p. 3,800.

**Cochin**, a fowl. See **Poultry**.

**Cochin**, feudatory state in India, lying between Travancore and Malabar, on the west shore of the Madras Presidency, with an area of 1,361 sq. m. Until about the middle of the 9th century Cochin formed part of the ancient kingdom of Chera or Kerala. In 1662 it was seized by the Dutch; and in 1799, on the fall of Seringapatam, it passed to the British; p. 979,019. The capital is Ernakolam. The chief commercial center is Mattancheri, adjoining the British town of Cochin.

**Cochin** (*Kochchi*, or *Kochchibandar*, 'small port'), a seaport town and former capital of Cochin state, Madras, India; 87 m. s.w. of Coimbatore. Tradition says that St. Thomas the apostle visited it in 52 A.D., and made several converts. In 1502 Vasco da Gama established a factory. In 1530 Cochin was visited by St. Francis Xavier. In 1663 it passed into the hands of the Dutch; in 1795 the English besieged and captured it, to whom it was formally ceded in 1814; p. 20,000.

**Cochin-China**, (French, *Basse Cochinchina*), French dependency in the extreme s.w. of Indo-China. Total area, about 20,000 sq.m. The coast has no port. Saigon, on the River Saigon, and Mytho, on a branch of the Mekong delta, accommodate vessels of largest tonnage. Cochin-China is mostly a vast, rapidly extending alluvial plain formed by the deltas of the Mekong and Donai, the Saigon, and the Great and Little Vaico, all connected by an intricate network of canals. To the east of the Saigon the land rises into an undulating wooded region 1,800 to 2,600 ft. high, which is said to contain gold and tin deposits. Forest covers nearly 20,000,000 acres. Canalization in Mytho province has reclaimed over 200,000 acres, and the yearly reclamation of land for rice averages 25,000 acres. The fauna comprises the tiger, panther, elephant, bear, serpent, pelican, ibis, etc. Buffaloes are employed as beasts of burden; zebu (oxen) are also used in harness. Swine, poultry, and ducks are largely reared. More than one-fourth of the total area is under cultivation, and of this about four-fifths are under rice.

Native industry produces jewelry, mats, and pottery, basket work, and also spirits distilled from rice. The exports consist of rice, areca nuts, pepper, cardamoms, gamboge, indigo, hides, silk, salt fish, live animals, isinglass, spices, and dyes. Cochin-China forms with Cambodia one customs division (see INDO-CHINA, FRENCH). The dependency is under the rule of a lieutenant-governor assisted by a privy council, and a colonial council composed of Europeans and natives. The population is about 4,000,000, mostly Annamese but there are also many Cambodians and Chinese. Cochin-China came under Japanese military control in 1941. See also INDO-CHINA and INDO-CHINA, FRENCH; for bibliography and map, see ANNAM.

**Cochineal**, (*Coccus cacti*), a Mexican scale insect living on the cactus called *Opuntia coccinellifera*. It is now cultivated chiefly in Guatemala. The cochineal insect is exceedingly small, a pound of cochineal dye being calculated to contain 70,000 in a dried state. The male is of a deep-red color, and has white wings. From the dried bodies of the insects, which feed in swarms on the cacti infected, and are collected by shaking or brushing them off on sheets, the dyes known as *Cochineal* and *Carmine* are obtained by maceration. Cochineal has been largely superseded by aniline colors.

**Cochituate, Lake**, in Middlesex co., Mass.; 17 m. w. of Boston. Area, about 1 sq.m. The water supply of Boston is partly obtained from this lake.

**Cochlea**. See **Ear**.

**Cochlearia**. See **Scurvy Grass**.

**Cochrane, Sir Alexander Forrester Inglis** (1758-1832), English Admiral. In 1801 he commanded the *Ajax* in Lord Keith's expedition to Egypt, and became second in command under Duckworth, taking part in the Battle off San Domingo (1806). He then co-operated in the reduction of St. Thomas, Martinique, and Guadeloupe. He was made a vice-admiral in 1809, attaining the rank of full admiral in 1819.

**Cochrane, Francis** (1852-1919), Canadian public official, was born in Clarenceville, Quebec. After serving in the Ontario legislature and ministry, he became Canadian Minister of Railways and Canals in the Borden Cabinet (October, 1911).

**Cochrane, Admiral Thomas (Lord)**. See **Dundonald**.

**Cochrane, Sir Thomas John** (1879-1872), English admiral, son of Admiral Sir A. F. I. Cochrane. In 1813, in the *Surprise*,

he captured the American privateer *Decatur*, subsequently assisting in the attacks on Washington and Baltimore. He became an admiral of the fleet (1865).

**Cockade** (French *cocarde*, or *coquarde*), an ornament or knot worn either as a military or naval decoration, or as the badge of a political party. Cockades made of ribbons of the national colors were worn by soldiers during the wars of the 18th century. After the Revolution, the tricolor ribbon took the place of the white cockade. In England, after the expulsion of the Stuart family, the white cockade became the distinctive mark of the adherents of the exiled house, in opposition to the orange of Nassau and the black of Hanover. Every nation of Europe now has its own cockade in which, as a rule, its national colors are combined. In England the cockades are always black, which was the old Hanoverian color.

**Cockaigne, Land of**, (French *Cocagne*), an imaginary country of idleness and luxury, the idea of which originated in the mediæval romances. In a secondary sense, the name is applied to London, the El Dorado of the rustic imagination.

**Cockateel**, a cockatoo of Australia of the genus *Calopsittacus*, commonly known as the 'Ground Parrakeet,' or 'Cockatoo Parrakeet.' It is about the size of a pigeon, is gregarious in habits, and in its free state nests in hollow trees.

**Cockatoo**, a popular name for several genera and species of parrot (*Psittaci*), that are native to Australia, Tasmania, New Guinea, and the Indian Archipelago. Cockatoos are characterized in general by a high curved beak, large head, long wings, and long rounded tail feathers. True cockatoos are commonly white, tinged with color, and bearing brilliant, erectile crests of long pointed feathers. The name is applied, however, to the black cockatoos of Australia and the Indian Archipelago, and to the crestless nasiterna of New Guinea.

**Cockatrice**, sometimes identified with the basilisk, was a monster fabled to come from eggs laid by the cock. Its appearance, in tradition and heraldry, is part fowl, part serpent; deadly by poison and look. The Biblical reference means a poisonous reptile. In mediæval art the cockatrice is an emblem of sin generally, and the special attribute of St. Vitus.

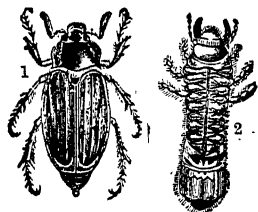
**Cockburn, Sir Alexander James Edmund** (1802-80), English judge. He was created a baronet (1858), and lord chief

justice (1859), represented Great Britain at Geneva in the court of arbitration between that country and the United States with regard to the *Alabama* Claims and published his report (1872). He presided over the Tichborne and Wainwright trials.

**Cockburn, Alicia, or Alison** (?1712-94), Scottish poetess, was born in Fairnalee, Selkirkshire. She was one of the first to discern the 'extraordinary genius' of Scott, a distant relative; and their admiration was mutual. In addition to her exquisite version of *The Flowers of the Forest*, which first appeared in *The Lark* (1765), she was the author of other songs. She wrote *Letters and Memoirs*.

**Cockburn, Sir George** (1772-1853), British admiral, was born in London. Attaining the rank of rear-admiral (1812), he was in command of the North American station during the War of 1812-15, and took a large share in the capture of Washington (August, 1814). After his return home, he took Napoleon to St. Helena on the *Northumberland* (1815). He was senior naval lord (1841-6) and admiral of the fleet (1851-3).

**Cockburn, Henry Thomas, Lord** (1779-1854), Scottish judge, was born in Edinburgh. He rose to share with Jeffrey the leadership of the bar, and with Jeffrey was counsel for three prisoners accused of sedition (1817-19). He became solicitor-general for Scotland under the Grey ministry in 1830; had the chief hand in drafting the Scottish Reform Bill; in 1834 was made, as Lord Cockburn, a judge of the court of Session; and three years later a lord of justice. He was founder of the Edinburgh Academy. His works include a *Life of Lord Jeffrey* (1852), *Memorials* (1856), and *Journal*, 1831-44 (1874).



*Cockchafer.*

1, Adult beetle; 2, larva.

**Cockchafer**, (*Melolontha vulgaris*), a beetle very common in some parts of the continent of Europe, and conspicuous on account of its large size (1 to 1¼ inches long)

and destructive habits. In the United States it is represented by a large group of dark-colored beetles, popularly known as *June Bugs* and *Dung Beetles*. The perfect insect emerges from the soil in spring, and begins its brief (a few weeks) aerial life, during which it is very destructive to the foliage of fruit and forest trees. In America the cockchafer has not become a pest.

**Cocker.** See **Spaniel**.

**Cocker, Edward** (1631-75), English arithmetician and author. Of his *Arithmetick* over 112 editions have appeared. 'According to Cocker' has passed into a proverb. He also wrote *A Guide to Penmanship* (1664).

**Cockerell, Charles Robert** (1788-1863), English architect, was born in London. He designed Hanover Chapel in London and the Taylor buildings at Oxford. He was professor of architecture in the Royal Academy (1840-57). He wrote: *The Temple of Jupiter Olympus at Argi-gentum* (1830), etc.

**Cockerell, Theodore Dru Alison** (1866), American zoologist, was born in Norwood, England. He has been professor of zoology since 1906, at the University of Colorado. His works relate principally to entomology, molluscs, palæontology, flowering plants, and general biological questions.

**Cockermouth**, town, Cumberland, England; 25 m. s.w. of Carlisle. Its 11th-century castle, on the Cocker River, became Mary Stuart's prison in 1568, and in 1648 was dismantled by the Parliamentarians. Wordsworth was born here in an old-fashioned house, still standing; p. 5, 204.

**Cock Fighting** was common among the ancient Greeks and Romans. We hear of it in England as far back as the 12th century. The amusement first became fashionable in the reign of Edward III.; but owing to the amount of gambling which it occasioned, the sport was prohibited in 1366. Henry VIII. had a cockpit built at Whitehall, and James I. is said to have attended cock fights at least twice a week. By an Act of the British Parliament in 1849, a penalty of \$25 may be levied on any person keeping fighting cocks, letting a cockpit, or otherwise connecting himself with cock fighting, for every day that he shall so act.

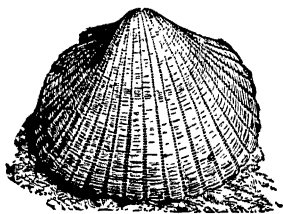
Partridges were sometimes pitted against each other in lieu of cocks, especially in Scotland, but the sport was in that case also called cock fighting. In the reign of George IV. artificial spurs, made of steel or silver, came into use; these were long, curved

blades or spikes, bound to the shank. Cock fighting was popular in France, Belgium, and Russia during the same period. In Russia, a kind of quail was often used, and the gambling was on a more extensive scale than in any other country. In Asia cock fighting is still widely pursued, especially among the Chinese, Siamese, and Malays. It is illegal in the United States, but is still carried on secretly. It is also a favorite pastime in the South American states and the Philippines, where the law does not forbid the practice.

**Cockie-leekie**, is in Scotland a kind of soup made of a fowl boiled with leeks.

**Cock Lane Ghost**, an imposture that in 1762-3 agitated all London, even Dr. Johnson sharing in the commotion. In a house in Cock Lane, Smithfield, unaccountable noises were heard, and in conjunction therewith a ghost was by a number of persons declared to have been seen. The noises were at last traced to a little daughter of Parsons, the occupier of the house, who produced the sounds on a small board she had in bed concealed under her stays.

**Cockle**, a weed. See **Corn Cockle**.



Shell of Cockle.

**Cockle** (*Cardium*), a large genus of bivalve molluscs (Lamel-libranchs) related to the American juohog, many of which are edible, and in Europe have considerable commercial value. The thick, ribbed, heart-shaped, equal-valved shell, and the large knee-bent 'foot' are characteristic. The shell is closed by two muscles; the hinge has large teeth; there are two minute respiratory siphons. The common cockle is *Cardium edule*, which is widely distributed over Europe, and inhabits sandy bays near low-tide mark. It is much used as food and bait. Other British species are also eaten.

**Cocklebur**, or **Clotbur**, is a coarse annual weed, a species of *Xanthium*, belonging to the Compositæ family. The plant is low and branching, and is distributed widely in almost every part of the temperate zone. *X. canadense*, *X. commune*, *X. speciosum*, and

*X. echinatum* are the distinct American species; while *X. spinosum* and *X. strumarium*, though found in the United States, are indigenous to the Old World. The weed is regarded as a pest, especially to the sheep-growing industry, as the hooked, spiny burrs cling to the wool, and injure its value.

**Cockney**, a contemptuous name for a person born with the sound of Bow Bells, London, hence a 'Londoner.' Minsheu explains 'cockney' as *incock* (*incoctus*), 'unripe in country affairs.' In Shakespeare a cockney means one versed only in town manners. Dr. Murray traces the word to *cocken-ey*, *cock's* egg, 'nestle-cock,' 'an effeminate fellow,' 'a milkop.'

**Cock of the Rock** (*Rupicola*), a genus of South American Passerine birds in the family of Cotingidæ or Chatterers. The feathers are highly valued by the natives of South America. The males go successively through an elaborate dance before an assembly of other males and females in special clearings in the forest.

**Cock of the Woods**, another name for the woodgrouse, capercaillie, or capercaillie.

**Cockpit**, in former sailing men-of-war a place situated near the after hatchway, under the lower gun deck. It was contiguous to the berths of the surgeon and his mates, and was the place where the wounded in action were placed. The word is also used for the ring in which cock fighting takes place; for the entrance way to a yacht cabin lower than the deck, and for the open spaces of an airplane in which pilot and passengers sit.

**Cockran**, (William) Bourke (1854-1923), American political leader and lawyer, was born in Ireland, and was educated there and in France. He went to the United States in 1871. Devoting himself to politics, he became prominent as a Tammany Democrat, attracting especial attention as a campaign orator. In 1891-5 he was a Member of Congress; in 1896 he became an advocate of the gold standard, and supported McKinley; but in 1900 he returned to the Democratic Party, and campaigned for W. J. Bryan.

**Cockroach**, any one of several species of insects of the orthopterous family Blattidæ. Cockroaches are among the most ancient and widespread of insects, and in every civilized country certain species have become a pest. The principal species are: 1. *Blatta germanica*, or *Ecotobia germanica*, the common brown cockroach of the United States, where it is known as the *Croton* bug. It is of

medium size, with long wings extending beyond the abdomen. 2. *Periplanta orientalis*, the small Oriental cockroach, which has become widely distributed, and is known in England as the 'Black Beetle.' 3. *P. americana*, the largest of all roaches, which had its origin in South America, but which has also become widely distributed. 4. *P. australasiae*, the Australian cockroach, similar to the preceding, but smaller in size.

Among the more striking external features of the cockroach are the antennæ longer than the body, the bent-down head, the long spiny legs compressed terminally, the flat, broad, segmented abdomen, and the cigar-shaped anal appendages. Cockroaches are voracious insects, devouring both animal and vegetable substances, which they seem to seek out by aid of their antennæ. They are nocturnal in habit, most abundant in warm countries, fond of sheltering in houses, and notoriously a pest to bakers and millers. For methods of preventing and suppressing them, consult Howard and Marlatt's 'Principal Household Insects of the United States' (U. S. Division of Entomology's Bulletin No. 4).

**Cockscomb.** See *Celosia*.

**Cock's-foot Grass.** See *Grasses*.

**Cockspur Thorn.** See *Cratægus*.

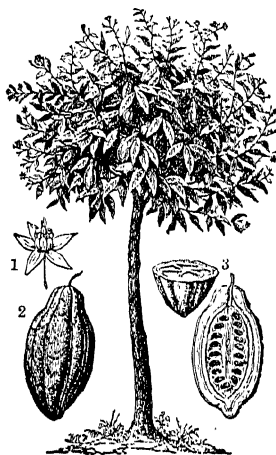
**Cocktail**, a stimulating drink usually composed of spirits, bitters, and sugar, with various aromatic additions. *Champagne cocktail* has an addition of Angostura bitters; *Manhattan cocktail* has a basis of whiskey with the addition of vermouth; *Martini cocktail* is gin and vermouth; *soda cocktail* is soda water plus a little bitters.

**Cockton, Henry** (1807-53), English novelist, was born in London. He is the author of *Valentine Vox*, the *Ventriloquist*.

**Cocles, Horatius.** See *Horatius Cocles*.

**Cocoa, Cacao, or Coco**, a food product prepared from the plant *Theobroma cacao*, an evergreen belonging to the order Byttneriaceæ. It is indigenous to tropical America, but is also grown in the West Indies, in Ceylon, in Portuguese West Africa and other tropical regions. The seeds are numerous, compressed, and not unlike almonds. These seeds are the *cocoa beans* of commerce. In commerce cocoa appears as either 'nibs,' 'flake,' or 'soluble' cocoa. In preparing the nib cocoa the seeds are simply roasted, and the skin and husk are removed. Flake cocoa is prepared from the nibs by grinding and pressing; a considerable quantity of the natural fat is removed, and the residue then

mixes more easily with water. A large number of the soluble cocoas, especially the cheaper varieties, contain only fifty per cent. of cocoa, the remainder being made up of added starch and sugar; the starch becomes thick with the boiling water, and suspends the cocoa in the liquid.



*Cocoa or Cacao.*

1, Flower; 2, pod; 3, sections of pod.

Cocoa essence and cocoatine consist of pure cocoa deprived of about half of its natural fat. *Theobromine*, the alkaloid of cocoa, is closely allied to the caffeine and theine of coffee and tea, and has the same stimulating effect. The fat, starch, and nitrogenous matters represent the actual food constituents; and assuming that all the nitrogenous matters are available as food, the dietetic value of cocoa is undoubtedly high.

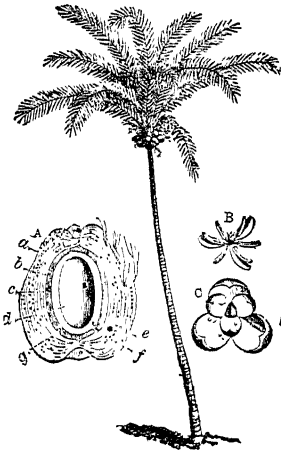
*Chocolate* consists of ground cocoa deprived of a portion of its fat, and sweetened with sugar; in addition, it often contains some flavoring matter. West Africa furnishes about two-thirds of the cocoa of the world, the bulk of which comes from Gold Coast and Nigeria. Consult Van Halls' *Cocoa* (1914).

**Cocoa, Brazilian.** See *Guarana*.

**Cocoa Butter**, a pure fat obtained from the seeds of the cocoa plant (*Theobroma cacao*) by pressing. It is used in the manufacture of cosmetics and confectionery and is said to be valuable in the treatment of skin irritations.

**Cocoanut, or Coconut**, the fruit of a tropical palm *Cocos nucifera* which reaches

a height of fifty feet or more and has long pinnate leaves which sometimes attain a length of twenty feet. Its original home was the islands of the Indian and Pacific Oceans, but it is now found in nearly all tropical regions. Almost every part of the tree can be put to economic use. On an average, each tree yields about eighty nuts each year. The kernel of the cocoanut contains about sev-



*Cocoanut Palm.*

A, Section of fruit; a, husk; b, shell; c, albumin; d, cavity; e, embryo; f, aperture of shell; g, rudimentary aperture; B, male flower; C, female flower.

enty per cent. of fat, which is largely used in the manufacture of candles and soap. (See *COPRA*.) The bark of the growing tree, when pierced, yields a juice which, after being kept for a couple of hours, makes a tart and refreshing drink. The coarse bristle fibre from the husk is used in the manufacture of brushes. The finer mattress fibre is spun into what is known as coir yarn (see *COIR*). The nut itself is used as food by the natives of those countries where it is produced; and the whole nuts and various desiccated products are exported. The shell is made to serve as a utensil. The leaves of the tree are woven into baskets, mats, and roofing material; and the wood, known as *porcupine wood*, is used for building, furniture, and firewood. The root has narcotic properties, and is sometimes chewed by the natives. The terminal bud (*palm cabbage*) is esteemed a delicacy, and the central part of the young stem is also succulent and eatable.

*Cocoanut Oil*, or *Cocoanut Butter*, is expressed from the dried kernel of the cocoanut, known as *copra*. It can be separated by pressure into a liquid and a solid portion, and is used in the preparation of artificial butter, marine soap, lard, and candles. It is also employed as a lubricant and illuminant, and by perfumers as an embrocation in the preparation of cosmetics. See *PALM*. Consult E. B. Copeland's *The Cocoanut*; R. Belfort and A. J. Hyer's *All About Cocoanuts*.

**Cocoanut Crab**, or **Robber Crab** (*Birgus latro*), a large species of crab nearly allied to the hermit crab, found on the coral islands of the Indo-Pacific region. It is a land form, and lives upon cocoanuts, which it is capable of opening with its powerful claws.

**Cocomas, Cocamas, or Cucamas**, South American Indians, who formerly occupied an extensive tract about the Marañon and Lower Huallaga, known as La Gran Cocomas. When first visited by the missionaries (about 1680) the Cocomas were addicted to cannibalism.

**Cocoon**, the silken sheath spun by the larvæ of many insects in passing into the pupæ or resting stage. The cocoon proper is due to the secretion of special spinning glands, situated anteriorly or posteriorly, but larval hairs and foreign objects of many kinds may also be utilized.

**Coco Root**. See **Cocco**.

**Cocos**. See **Keeling Islands**.

**Cocytus**, (modern *Vuvos*), a river of Epirus, a tributary of the Acheron, supposed to be connected with the lower world. Homer makes it a branch of the Styx.

**Cod** (*Gadus callarias*), a fish of the family Gadidæ, which includes the haddock, whiting, pollack, ling, hake, and torsk. The name cod is also applied to the entire family. The average weight of a full-grown fish is from 20 to 35 pounds, although many larger specimens have been recorded. Cod are essentially deep-water fish, and travel in schools, their movements being governed mainly by temperature changes, the abundance or scarcity of food, and the search for suitable spawning grounds. They are exceedingly prolific, a single fish producing from two to nine million eggs. The members of the cod family are confined to the Arctic and North Temperate zones. The common cod-fish ranges in American waters from Cape Hatteras to Greenland, being especially abundant off the coast of the Middle States, New England, and Canada. On the coast



of Europe the cod fisheries are an important industry from the Bay of Biscay, north to Spitzbergen.

The *Alaska cod* (*G. macrocephalus*) frequents the Bering Sea and the Northern Pacific from Cape Flattery to Hakodate, Japan. The cod is one of the most valuable of food fishes. The flesh is white and flaky, absorbs salt readily, and is especially suitable for drying. It is of further economic importance as the source of cod liver oil. The preserved 'sound' or swim-bladder is esteemed a delicacy, and is used in a dried state as isinglass.

The principal cod fisheries are those along the coast of Norway, especially at the Lofoten Islands—where, according to the Norse sagas, cod fishing was established in Viking times; at Iceland; off the Shetlands and Orkneys; on the Dogger Bank; and off the coast of Newfoundland and New England. American fishing is done mainly on the Grand Banks and other shoal places near Newfoundland, or on George's Banks off Cape Cod, where inshore fisheries were long ago exhausted. The headquarters of the industry are at Gloucester and Boston, Mass. The annual value of the total catch for the United States averages between \$2,000,000 and \$3,000,000.

Canadian fishing interests are kept apart from those of the United States by strict international regulations, though both nations fish in the same waters. See COD LIVER OIL. Consult D. S. Jordan and B. Evermann's *Food and Game Fishes of North America*.

**C. O. D.**, the usual form employed for the phrase 'cash on delivery,' meaning an article must be paid for when delivered at the purchaser's home or place of business.

**Coda** (Italian 'a tail'), that section which forms the conclusion of a musical composition. Originally it frequently consisted of a few simple chords, but modern composers—notably Beethoven—have developed the coda into a feature of great importance.

**Cod, Cape.** See **Cape Cod**; **Cape Cod Canal**.

**Coddington, William** (1601-1678), American colonist, was born in Boston, Lincolnshire, England. He went to Plymouth, Mass., in 1630 and was included in the nineteen who were obliged to remove from Massachusetts, and who purchased the inland of Aquidneck, now Rhode Island. Of this settlement he was governor from 1651 to 1655, when he was ousted by Roger Williams and

John Clarke, and again from 1674 until his death.

**Code** (Latin *codex*) in modern times signifies an authoritative statement either of the whole body of law prevailing in a particular jurisdiction, or of a definite branch of the same. Though the term is sometimes popularly applied to a compilation of law of a comprehensive character made without legislative authority, and sometimes to a statutory revision of a part of the law—as *Penal Code*, *Military Code*—it is strictly applicable only to a statutory restatement of the entire body of the law of a state. The codes published under the Roman Empire were simply compilations of enactments by the emperors, arranged systematically under various headings. The *Codex Justinianus* was by far the most important of Roman codes, embodying as it did the earlier ones with the addition of subsequent constitutions.

When the Roman Empire had succumbed to the inroads of northern tribes, the barbarian rulers of different parts of the former imperial dominion published codes based on Roman law for the use of their subjects. These are generally called the *Romano-barbarian* codes, and were all published in the early years of the 6th century. There are also a number of early codes found in different parts of Western Europe which show little or no traces of Roman influences. The codification of modern law may be said to have originated with Frederick the Great of Prussia. The famous code promulgated between 1804 and 1810 under the auspices of the Emperor Napoleon finally established French law on a uniform basis (see CODE NAPOLÉON). In Germany two commercial codes were sanctioned by the North German Confederation. After 1871 these codes were put in force throughout the German Empire. In 1900 a gigantic codification of the entire German civil law was published as the result of the labors of a commission which sat for many years. In Great Britain the Bills of Exchange Act (1882), the Partnership Act (1890), and the Sale of Goods Act (1893) are codifications of the law on each of these subjects.

In the *United States*, several codes were issued by the colonies before the Revolution. In 1848 New York adopted its present code of civil procedure, which later became the model for other States. A code does not stereotype law any more than a dictionary stereotypes language, but merely states in

clear terms what the actual rules existing at a given moment are. It is, however, conceded that codes must be continually revised in accordance with the new developments in jurisprudence. Judicial interpretation can never be done away with; and it has been found in those of the United States which have codes that cases constantly arise where it is necessary to refer to the common law. See PENAL CODE. Consult Carter's *Proposed Codification of our Common Law*; Dillon's *Our Legal Chaos*.

**Codeine**,  $C_{17}H_{15}(CH_3)NO_2 + H_2O$ , is one of the alkaloids of opium, whence it is obtained by precipitating an infusion with chalk and calcium chloride. The chlorides of morphine and codeine which crystallize out are then dissolved in water and treated with ammonia. The morphine crystallizes, and the filtrate is evaporated for codeine. It may also be obtained from morphine by methylation. It has a slightly hypnotic action but less than that of morphine, and is used to quiet cough and to fulfill other minor narcotic indications. See OPIUM.

**Code Napoléon**, the popular name of the great codification of French civil law which was first promulgated March 30, 1804. It is the legal embodiment of the Revolutionary principle of equality, applied to the principles of the Roman law, current in France from its beginnings, and to the mass of old customary laws. Known at first as the *Code Civil des Français*, it became the *Code Napoléon* (1807), but at the Restoration (1815) resumed its old title. Its division is practically the same as Justinian's and Blackstone's, and consists of persons, goods and property, and inheritance, contracts, and obligations. Its influence on more recent codes has been great.

**Code, Telegraphic.** See **Telegraphy**.

**Codex**, the name applied to certain ancient MSS. of the classics or of the Scriptures. A codex, as contrasted with the papyrus roll, which it superseded, consists of a number of leaves of vellum, paper, or other material, arranged in quires and bound together in book form. The earlier codices are written in capitals or uncials, with no separation of words, punctuation, breathing marks, or accents; and the text is arranged in columns or written directly across the page. The later codices—from the 8th to the 15th century—are written in small or minuscule letters. Among famous uncial codices are the three great codices of the Bible in Greek. See BIBLE; MANUSCRIPTS; PALÆOGRAPHY.

**Codicil** (Latin *codicillus*), in Roman law,

denoted an informal writing of a testamentary nature, which, if confirmed in a will, was read as part thereof; but if not so confirmed, merely operated as a trust imposed on the deceased's heir. In modern law a codicil is an instrument executed for the purpose of adding something to a will already made, or of altering or explaining its terms. There is no restriction on the number of codicils which may be added, but they must be executed with the same formalities as are required in the case of the will itself. See WILL.

**Codification.** See **Code**.

**Codling Moth** (*Carpocapsa pomonella*), a small tortricid moth, an almost universal pest of apple orchards. It deposits its eggs upon the leaves or the fruit of apple and occasionally other fruit trees, where they hatch in about eleven days. The young larva enters the fruit at the calyx or some irregularity on the surface, tunneling its way to the core, where it eats out an irregular cavity.

**Cod Liver Oil** is the oil extracted from the fresh liver of the cod and allied fishes found in the North Atlantic Ocean. The method devised by Möller in 1853 is now largely used in its production. Cod liver oil is the most easily digested of all fats, possesses high nutritive qualities, and is a valuable therapeutic agent in many diseases. (See EMULSION).

**Codman, Robert** (1859-1915), American Protestant Episcopal bishop, was born in Boston. He was rector of St. John's, Roxbury, Mass., from 1895 to 1900, and bishop of Maine from 1900 until his death.

**Codrington, Sir Edward** (1770-1851), English admiral, was born in Gloucestershire. At Trafalgar, in 1805, he was captain of the *Orion*, and leader of a squadron. In the War of 1812 he commanded the fleet at Washington and Baltimore, afterward taking part in the attack on New Orleans. In 1821 he was made vice-admiral; and he was in command of the combined fleets of Great Britain, France, and Russia at the Battle of Navarino (1827), but was recalled for exceeding his instructions. He became admiral in 1837.

**Codrington, Sir William John** (1804-84), British general, was the second son of Sir Edward Codrington. In 1855 he was made commander-in-chief in the Crimea. In 1859-65 he was governor of Gibraltar.

**Codrus**, the last king of Athens, was the son of Melanthus, and according to Greek legend, sacrificed his life for his country about 1070 B.C.

**Cody, Samuel F.** (d. 1913), British aviator, was born in Texas. He constructed a

successful biplane in 1909, and as early as November, 1910, accomplished a flight of 110 m. in 2 hours and 45 minutes. In 1911 he won the British Empire Michelin Cup and \$2,500 for a flight of 261 m. 800 yds.; and in 1912 he took a prize of \$20,000 in the British army aviation tests. He was killed in an aeroplane accident at Aldershot.

**Cody, William Frederick** (1848-1917), American scout and showman, popularly known as **BUFFALO BILL**, born in Scott co., Iowa. During the construction of the Union Pacific Railway he contracted to furnish the laborers with meat; and in 18 months (1867-8) is said to have killed about 4,300 buffaloes. He was brigadier-general of the Nebraska National Guard, and served in that capacity during the Indian Wars of 1890-91. Cody then organized his 'Wild West Show,' which periodically toured the United States and Europe. He published *The Life of Hon. William F. Cody* (1879): *Turning the Trackless Plains into an Empire* (1916), etc.

**Coe, Wesley Roswell** (1869), American biologist, was born in Middlefield, Conn. He has been professor of biology (since 1909), at Yale University. He accompanied the Harriman expedition to Alaska in 1899. He has published numerous papers dealing with the anatomy and embryology of invertebrate animals.

**Coeducation**, a term applied to the education of the two sexes in the same institution or in the same classes. As an administrative problem in education, the subject of coeducation acquired importance only toward the middle of the 19th century. So far as the *elementary schools* are concerned—that is, up to the ages of 12 or 14—the principle of coeducation is generally accepted in the rural schools and in the smaller towns of most countries, largely as a matter of economy, partly because sex differences do not become pronounced before those ages. In the United States about 96 per cent. of the pupils are in mixed schools.

In the field of *secondary education*, which covers the adolescent period, the subject of coeducation appears to be more debatable, as is indicated by the varying practice in different countries. Germany and France segregate the sexes rigorously, and maintain separate systems of schools for girls. In Great Britain the practice is not uniform. The larger centers, however, are separating the sexes as soon as new schools can be established to meet the demands. In the United States, the public high schools are coeducational, with few

exceptions. The reasons for their development are simple: the public high schools arose to meet the demands for equality of educational opportunity, and the demand for the higher education of girls was almost contemporaneous; to this was added the administrative need for economy, with the result that both sexes were admitted to the same school.

Coeducation in *colleges* and *universities*, unlike the practice in secondary schools, is accepted generally. Women enjoy equal opportunities with men in most of the European universities, but these have been won only within the last quarter of a century. In Great Britain, practically all the new universities admit women to all the faculties; while in the University of Durham and the Scottish Universities there are but few restrictions. The older universities of Oxford and Cambridge still admit women to lectures and examinations only by courtesy, but withhold degrees from them. In the U. S., coeducation in colleges and universities is almost universal in Middle Western and Western States; in the East, separate colleges preponderate; only Harvard and Princeton still exclude women from their graduate departments. In 1944 the U.S.S.R. discontinued coeducation in high schools.

The discussion of the theory of coeducation centers around the secondary school period, or better, the period of adolescence from about the age of twelve to eighteen. The objections are based largely on physiological grounds. The rate of progress of the two sexes during the period of puberty is different, with the consequent dangers from coeducation that girls who are more sensitive and conscientious in their work may suffer from overstrain in trying to keep up with the boys of their class, or that the boys may fall behind the girls and stagnate permanently. Another objection is pressed on moral grounds, but experience has not proved that there is any danger here. The modern educator has shifted his ground, and his objection is no longer to mixed schools, but to mixed classes doing exactly the same work, irrespective of the different needs of the two sexes. Except in the larger cities, indeed, it is economically impossible to provide separate schools for boys and girls. Consult G. S. Hall's *Adolescence*; Woods' *Coeducation*; C. Grant and N. Hodgson's *Case for Coeducation* (1913).

**Coefficient**. In Mathematics, if a number or an expression is the product of two factors, then either factor is called the coefficient

of the other. In such expressions as *sax*, the factor consisting of Arabic figures is often called the 'coefficient of the expression.' See EQUATION.

In Physics, a number used to measure some one of the properties of a given substance is called coefficient. Thus, the coefficient of expansion of a substance is the amount of expansion of a body of unit magnitude due to a unit increase in temperature. See HEAT; FRICTION; LIGHT.

**Coehoorn (Cohorn), Menno, Baron van** (1641-1704), Dutch military engineer, was the successful rival of the French Vauban. He distinguished himself in many important engagements. The fortifications of Breda, Namur, and Bergen-op-Zoom were his work. He was the inventor of the small portable mortar called the coehoorn.

**Cœlenterata**, a division of invertebrate animals, including such common forms as Corals, Sea Anemones, and Jelly-Fish. The Cœlenterata do not possess an alimentary canal as distinct from the general cavity of the body, whence their name ('hollow-bodied'). Two types of structure occur, often in the same life history: the *polypoid* type, represented in the sea anemone, and the *medusoid* type, represented in the jelly-fish. In various groups the polyp type develops a skeleton of lime, and thus forms coral, while there is frequent budding, resulting in the formation of a composite colony. Almost all the Cœlenterates inhabit the sea, while the few that occur in fresh water exhibit modifications which show that this habitat is a secondary one. The three main classes of the Cœlenterata are: Hydrozoa, Scyphozoa, and Ctenophora; and the first two of these contain a considerable variety of organisms. For further information, see the articles ALCYONARIA; CORALS; CTENOPHORA; HYDROZOA; JELLY-FISH; POLYP; PORTUGUESE MAN-OF-WAR; SEA ANEMONE; ZOOPHYTE.

**Celestines.** See **Celestines**.

**Cœle-Syria**, ('Hollow Syria'), now called by the natives *El-Bukā'a*, or *Bekā'a*, 'the deep plain,' a valley of Syria, extending between the ranges of the Lebanon and Anti-Lebanon. It is 1,706 ft. above the sea, and is watered by the Orontes (now El-Asi). Above the valley stand the ruins of Baalbek.

**Cello, Claudio** (?1621-93), last of the great Spanish painters of the 17th century, was born in Madrid. His masterpiece is an altar piece in the Escorial, of great power and splendor, representing Charles II. and his courtiers adoring the Host.

**Cœlostāt.** See **Siderostat**.

**Cœnobites**, monks living as members of a community as opposed to the *anchorites* or *hermits*, who led solitary lives. See MONASTICISM.

**Coercion**, in general, forcible constraint or compulsion. Legally, coercion takes place when a person is driven by another to the performance of some act contrary to his will, either by physical force or intimidation. Since a will is necessary to the commission of a crime or the making of a contract, a person doing either under coercion, and therefore not of his own will, is not held responsible. See DURESS.

**Coercion Acts.** See **Ireland, History**.

**Coercive Force.** See **Magnetism**.

**Cœur d'Alene, Lake**, Idaho, situated among wild mountains in Kootenai co.

**Coffee**, as known in commerce, consists of the seeds of two species of a small tree or shrub, the *Coffea arabica* and the *Coffea liberica*. Originally introduced from Kaffa, Abyssinia, where it grows wild, an infusion



*Coffee.*

A. Berry, cut to show seeds.

of the seeds or leaves of the coffee tree has been used as a beverage from time immemorial. It was taken into Arabia at the beginning of the 15th century, and a hundred years later came into favor in Constantinople. About the middle of the 17th century it was introduced into England by a merchant from Smyrna. As a cultivated crop it reached America from the French plantations in Martinique, and thence spread rapidly over the warmer sections of the hemisphere. It is now extensively grown in India, Ceylon, Java, the West Indies, Central America, Mexico, Venezuela, Colombia, and particularly in Bra-

zil, where it forms two-thirds of the export trade.

The plant belongs to the botanical order Rubiaceae, which also includes Peruvian bark and ipecacuanha. The coffee tree is a slender evergreen, reaching naturally 20 ft. in height, but usually pruned to a pyramidal form of from 6 to 10 ft. high. When ripe, the fruit is gathered (usually three times a year), and subjected to washing and soaking for some hours in tanks of water to soften it, after which the pulp is removed by machinery. The berries are then allowed to undergo a certain fermentation and subsequent washings until quite clean of pulp, and are dried in the sun. The final stage in the preparation consists in removing the parchment skin by running the beans through a mill under very light pressure, breaking the parchment, which is winnowed out. Before being used for the beverage known as coffee, the beans are roasted, the best temperature being  $210^{\circ}$  F., and ground.

There are several methods of making coffee. The older method is by boiling or steeping; some cooks using cold water and bringing the infusion to the boiling point, others starting with boiling water and allowing the infusion to boil for ten or more minutes. A second method is by the use of a coffee percolator, a special pot with a strainer at the top to hold the coffee, over which the water is forced by means of a central tube. Still a third method is used for what is known as 'drip' or 'filtered' coffee; this is prepared by pouring boiling water slowly through finely ground coffee which has been placed in a square or bag of linen or coarse cotton. Coffee is a stimulant to the heart and nervous centers. In excess it may act as a poison, producing toxic symptoms, such as tremor of the muscles, nervous dread, and palpitation of the heart. These injurious effects are attributed to its caffeine content. Recently 'decaffeinated' coffee, from which practically all the caffeine has been removed, has been widely advertised. Coffee is an antidote to poisoning by opium and alcohol.

Ground coffee is subject to adulteration but the mixture with chicory cannot always be called an adulteration, for the flavor and body thus added to the beverage are favored by many consumers. There are many coffee substitutes in the market, most of which are prepared from cereals. The original Mocha came from Arabia; it now comes from Brazil. Most of the differences in flavor depend

upon the skill exercised in the roasting process.

**Coffee-houses**, places of refreshment partaking somewhat of the character of the modern club. The first city in which coffee-houses are known to have existed is Cairo. In the latter part of the 16th century they were established in Constantinople, and from there the knowledge of them was carried to the court of Louis XIV. by the ambassador of Mohammed IV. The first coffee-house in England, according to Wood, was opened at Oxford by Jacobs, a Jew, in 1650. Coffee-houses shortly afterward came to be places of popular resort. One of the most noted was Garraway's, in Change Alley, where tea was first sold in England, and which was much frequented during the South Sea Bubble. Other famous houses were Jonathan's, close to Garraway's; the Rainbow, in Fleet Street; Wills', which Dryden made the great resort of the wits of his time and which was the open market for libels and lampoons; Button's, patronized by Addison and Pope; Tom's, frequented by Garrick.

**Cofferdam**, an enclosure constructed with the object of excluding water and permitting the execution of work in open air below water level, as on the bottom of a river or lake or below the water level on land. Such work includes excavation for and the construction of foundations for sea walls, bridge piers, locks, dams, sewers, and deep cellars. The oldest and simplest form of cofferdam consists of a bank or dyke of earth surrounding the site of the proposed work, of sufficient cross-section to prevent leakage and provide the required stability. The character of cofferdams varies from this simple dyke up to a complicated structure of timber, steel, or concrete. Choice among the various types for any given work is based principally on the depth of water and character of material to be encountered.

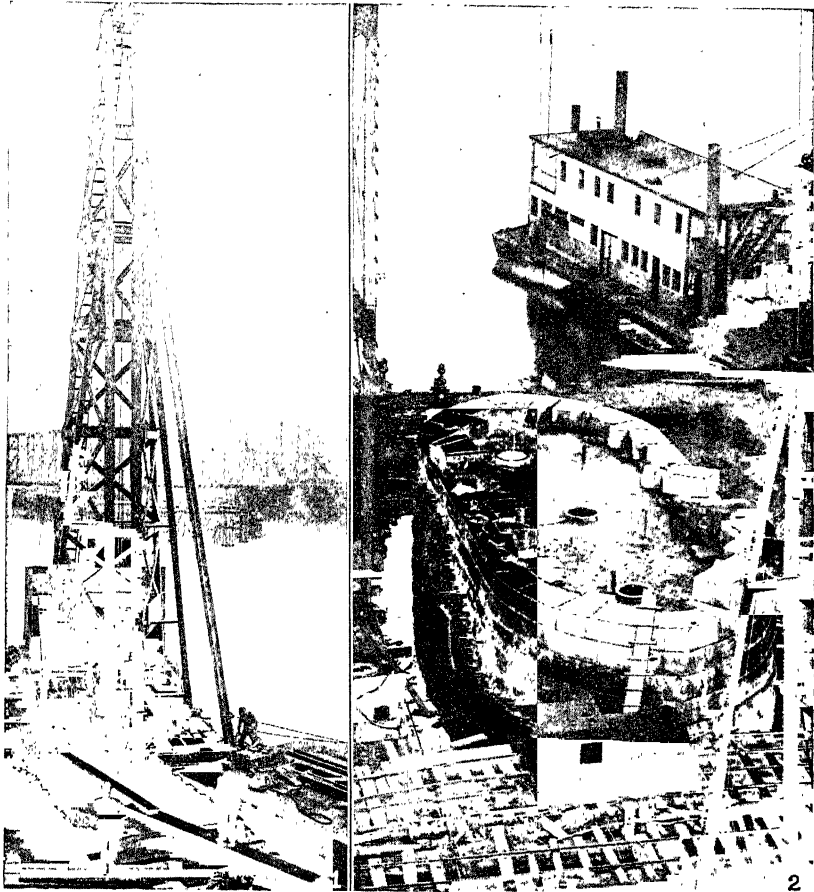
A cofferdam is in reality a temporary dam completely enclosing an area. The pressure due to the water on the outside of a cofferdam varies increasingly from the top to the bottom, and must be opposed either by cross-bracing between cofferdam sides or by the stability of the cofferdam walls themselves. Hence, there are, in general, two distinct types: the cross-braced type and the self-sustaining type. Permanent cofferdams formed of reinforced concrete caissons properly braced by the basement floors have been used recently in constructing deep cellars for

large buildings. The basements, sub-basements, and cellars in some examples extend 80 ft. below street level, even when the water level is at or near the street level.

See CAISSONS; DAMS; DREDGING; PILES, ETC.

**Coffer Fish, Trunk Fish, or Box Fish,**

earliest use of the coffin is traced to Egypt, and in Genesis we read that the body of Joseph was placed in a coffin—the only such mention in the Bible, biers being in common use among the Jews. The early Greek and Chaldaean coffins were made of clay moulded around the body after death, and subsequent-



COFFERDAM.—FIG. 1. Steel Sheet-Pile Cofferdam for River-Bank Work, Under Construction. FIG. 2. Building a Bridge Pier Inside a Cofferdam. (The pier is so far advanced that the protection of the cofferdam is no longer needed, and it has been allowed to fill with water.)

a name applied to certain tropical and sub-tropical fish, of the genus *Ostracion*, remarkable for the hard shield or carapace with which the body is covered, which is made up of six-sided scutes joined together in a mosaic.

**Coffin** ('casket'), the box or chest in which dead bodies are enclosed for interment. The

ly baked. The Egyptian coffins were of wood or stone or of *papier maché*, as seen in the mummy cases. Coffins of wood, marble, and stone were constructed by the early Greeks and Romans, but in later times the practice of cremation was adopted. The ancient Chinese coffin was shaped like a small junk, and this form is retained to the present time. In

Great Britain, as also in Scandinavia, coffins have been used from the remotest period, the earliest form being the *kistvaen*, really a vault or lining of the grave. The most primitive wooden coffins were formed from a section of the trunk of a tree, split from end to end and hollowed out in the center. The American Indians often made use of the canoe for a coffin. The coffin or burial casket of the present day is of metal, or of wood lined with metal—lead, copper, or zinc—and often covered with cloth. See BURIAL; BURIAL CUSTOMS.

**Coffin, Charles Carleton** (1823-96), American journalist, was born in Boscawen, N. H., was occupied as a surveyor and telegrapher in youth, and installed the first electric-fire-alarm system in Boston. He was engaged in journalism in Boston from 1855 until the opening of the Civil War, when he went to the front as correspondent for the *Boston Journal*. His letters in this paper, appearing over the signature 'Carleton,' first brought him to prominence. He published two notable war stories for boys, *Following the Flag* (1865) and *Winning His Way* (1865).

**Coffin, James Henry** (1806-73), American meteorologist, was born in Williamsburg, Mass. While a tutor at Williams College (1840-43), he erected an observatory with self-registering instruments on Mount Greylock. From 1846 until his death he was professor of mathematics and astronomy in Lafayette College, Pa., and there conducted the investigations upon which rests his reputation as a meteorologist, particularly in connection with the circulation of the air.

**Coffin, Robert Tristram** (1892- ), American poet. In 1936 he won the Pulitzer prize for poetry with *Strange Holiness*.

**Coffin, William Anderson** (1855-1925), Am. painter and author, born in Alleghany, Pa. His specialties were landscape and figure paintings; in 1886-91 and 1903-4, art critic of the *New York Evening Post* and the *Nation*; 1896-1900 of the *N. Y. Sun*.

**Cogalniceanu, Michael** (1817-91), Roumanian historian and statesman, was born in Jassy. An earnest advocate of the union of the principalities (Wallachia and Moldavia), he became prime minister under Prince Cuza in 1859, and helped him to introduce the democratic legislation of 1864. During the reign of King Charles he was minister of the interior (1868-70 and 1879-80), and he represented Roumania at the Congress of Berlin. He also published *Cronicele Romaniei* and *Esquisse sur les Tziganes*.

**Coghlan, Charles Francis** (1841-99), Irish-American actor and dramatist, was born in Paris, France. His first appearance in New York was in Augustin Daly's company as Alfred Evelyn in *Money* (1876), from which time, for many years, he was one of the most popular leading men in the United States.

**Coghlan, Joseph Bullock** (1844-1908), American naval officer, was born in Frankfort, Ky. He was graduated from the U. S. Naval Academy in 1863. He commanded the *Raleigh* on the Asiatic station in 1898, and took part in the battle of Manila Bay, the *Raleigh* firing the first shot. He was made rear-admiral in 1902, and was in command of the North Atlantic Station (1902-3). He was commandant of the Brooklyn Navy Yard in 1904-7, although retired in 1906.

**Coghlan, Rose** (1853-1932), Irish-American actress, sister of Charles F. Coghlan, was born in Peterborough, England. She played in comedy and farce in London and provincial theaters until her first appearance in New York, with Lydia Thompson, in 1872. She afterward played with E. A. Sothorn and with Barry Sullivan in London. Returning to the United States in 1877, she was leading lady at Wallack's Theater, New York, until 1889.

**Cognac**, town, Southwestern France, in the department of Charente, on the River Charente; 25 m. n.w. of Angoulême. It is built on a hill crowned by the old castle where Francis I. was born in 1494. The town is a center of brandy production, giving its name to the famous Cognac brandy. In Cognac was concluded (1526) the Holy Alliance between Francis, Henry VIII. of England, the Pope (Clement VII.), and the Duke of Milan against Charles V. of Germany; p. 18,876.

**Cognates**, an ancient civil-law term denoting collateral relations through the female line. They did not have the same rights of inheritance as the *agnates* or relations through the male line, though special provision was made for them in this respect in certain cases. This term is seldom employed in law at present, as the above distinction has been practically abolished in most jurisdictions. See AGNATES.

**Cognition**, the act of knowing or becoming discriminatingly conscious of—either as to an object or an abstract truth. In a strict psychological sense, it is the presentation of an object by any means to the conscious understanding. See METAPHYSICS.

**Cogswell, Joseph Green** (1786-1871), American bibliographer, was born in Ipswich,

Mass. From 1848 to 1861 he was superintendent of the Astor library in New York, and collected the books for that institution and prepared its catalogues. He contributed much to the cause of library organization in the United States. Consult Ticknor's *Life*.

**Cog Wheel.** See **Gearing**.

**Cohan, George M.** (1878-1942), American playwright, producer and composer, was born in Providence, R. I. He began his stage career when nine years old, and at twelve played the title rôle in *Peck's Bad Boy*. In 1901 he began appearing in plays written by himself. *The Governor's Son* and *Running for Office* were followed by *Little Johnny Jones* (1904); *Seven Keys to Baldpate* (1913), et al. Among his many songs are *Give My Regards to Broadway*; and the popular song, *Over There*. In 1933-34 he starred in O'Neill's play *Ah Wilderness*; and in 1937-38 in Kaufman's *I'd Rather Be Right*.



George M. Cohan.

**Coherer.** See **Electro-Magnetic Waves**; **Wireless Telegraphy**.

**Cohesion** is the molecular force that holds together the particles of solids or liquids. In solids it is measured by the tensile stress under which they break. After rupture, as the molecular force acts only over the very minutest distance, cohesion cannot be restored without reuniting the solid by such a process as fusion. Cohesion of liquids is less marked than that of solids, and is of two kinds—(1) that due to the skin action, to

which such phenomena as the formation of drops, etc., are due (see **SURFACE TENSION**), and (2) the cohesion throughout the mass of the liquid, which, though difficult to observe, will resist considerable stress. See **SOLIDS**; **LIQUID**; **STRENGTH OF MATERIALS**.

**Cohr, Adolphe** (1851-1930), French-American educator and writer, was born in Paris, France. He came to the United States in 1875, taught French at Columbia and Harvard Universities, and in 1891 became professor of Romance languages and literature at Columbia. He was editor of the Silver series of modern language text-books, and of *French Classics for English Readers*. He wrote, in collaboration with others, *Voltaire's Prose* (1897), *Le Sage's Gil Blas* (1889), and *Montaigne* (1907). He founded the Alliance Française de New York in 1898.

**Cohn, Ferdinand Julius** (1828-98), German botanist, was born in Breslau. He was among the first to carry on investigations into plant life and animal cells, and made many important discoveries concerning the lower forms of life. He may fairly be termed the founder of bacteriology, having in 1854 established the fact that bacteria are plants. He received the gold medal of the Linnæan Society in 1895. Consult *Memoir* by his wife.

**Cohort**, a division of the Roman legion, containing originally 600 men, divided into six centuries, with a *vexillum*, or standard-guard. In every legion there were ten cohorts. See **LEGION**.

**Cohosh, Black** (*Cimicifuga racemosa*), commonly known also as *black snakeroot*, is a medicinal plant belonging to the ranuncul or crowfoot family. The extract of the root is used for rheumatic affections. Among the Indians it is used for snake-bite.

**Coif**, the close-fitting cap of white lawn or silk, originally worn by sergeants-at-law. It was formerly the custom to wear a small skull-cap of black silk or velvet over the white coif; later the coif was represented by a small round patch of black silk edged with white, worn on the crown of the wig.

**Coil, Induction.** See **Electricity, Current**.

**Coimbatore, or Kayambatur**, capital of the fertile Coimbatore district, Madras, India, 85 m. s.e. of Calicut. Commanding the Palghat Gap and the Gazalhatti Pass, it is an important military post; p. 65,788.

**Coimbra**, a district of Beira, Portugal, stretching from the Sierra da Estrella to the Atlantic. Area, 1,508 sq. m.; p. 353,121.

**Coimbra**, city and episcopal see, Portugal



capital of the province of Beira, on the Mondego, 110 m. n.e. of Lisbon. It is divided into two parts, the older Upper Town which still has a mediæval aspect, and the modern Lower Town lying along the river banks. The most notable buildings and institutions are the university, founded in 1290, and having a famous library of 100,000 volumes; the Church of Santa Cruz with its tombs of the first Affonsos; the Bishop's Palace, now a ruin; the old Cathedral of 12th-century architecture, and the ancient convent of Santa Clara, partly in ruins. Several Portuguese sovereigns held their court in Coimbra from the 12th to the 15th century, and here Inez de Castro, beloved of Peter the Cruel, was murdered (1355); p. 20,841.

**Coin**, town, Spain, in the province of Malaga, finely situated on the northern slopes of the Sierra de Mijas; 17 m. s.w. of Malaga. It is known as the 'Garden of Andalusia,' and is set in the midst of orchards, vineyards, and gardens of great luxuriance; p. 13,000.

**Coinage**, the making of coins for use as money; also the money so made. The right of coinage is usually a prerogative of the state, the purpose of the exclusive exercise of this right by the government being to provide coins that are of guaranteed uniformity in weight and fineness, easily cognizable, and so constructed as to prevent counterfeiting, clipping, and abrasion. The metallic money of a nation includes two classes: (1) The standard coinage, consisting of those coins which are made in unlimited quantities for persons who deposit bullion, and which are full legal tender for all debts. (2) The subsidiary coinage, consisting of those coins, usually of smaller denominations, which the government makes in limited amounts, and sells to individuals for more than bullion value for use in small transactions, and which are usually of limited legal-tender power.

In the United States, Art. 1. Sec. 8 of the Federal Constitution gives Congress the exclusive right to coin money and regulate the value thereof. The first coinage act, that of April 2, 1792, provided for coins of gold, of silver, and of copper. The silver dollar of 371¼ grains of pure silver and 44¾ grains of alloy was made the unit of value. The coinage of the silver dollar has practically ceased in recent years, owing to the exhaustion of bullion purchased under the Act of 1890. By the act of Jan. 14, 1900, the gold dollar was declared to be the 'standard unit of value' of the monetary system of the United States; but 'the obligation is placed

upon the treasury of maintaining the silver dollar at a parity of value with gold. At present (1924) the metallic money of the United States consists of the following classes: (1) Gold double-eagles, eagles, half-eagles, and quarter-eagles, which are full legal tender. (2) Silver dollars, which are full legal tender, unless otherwise stipulated by contract. (3) Smaller silver coins, half-dollars, quarter-dollars, and dimes, which are legal tender for debts not exceeding ten dollars. (4) The nickel five-cent piece and the bronze cent, which are legal tender up to twenty-five cents.

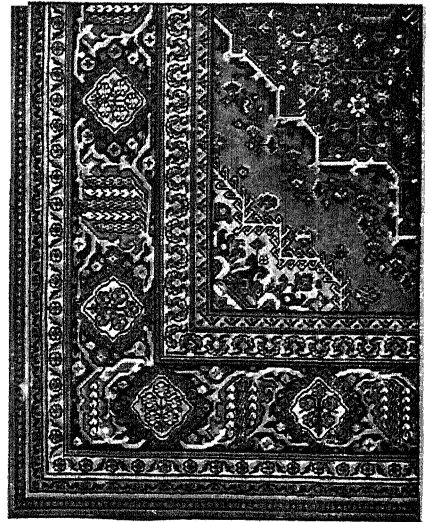
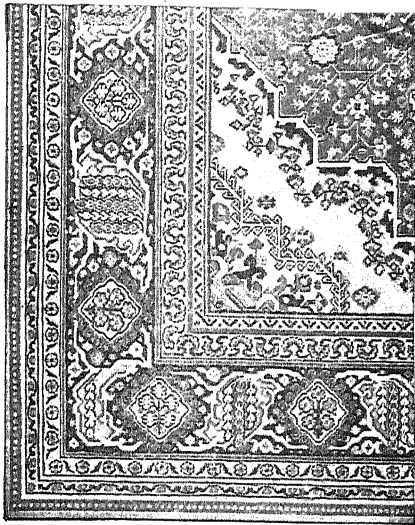
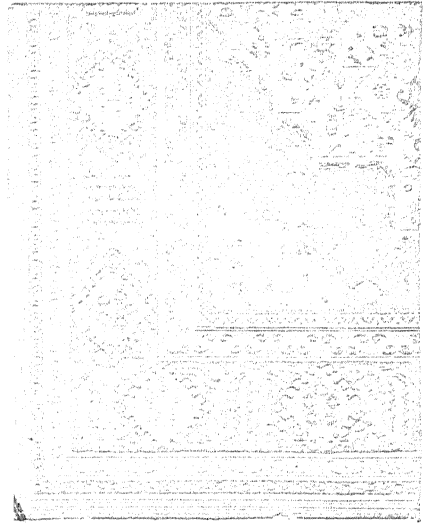
Early in 1933 came a banking crisis, and in March the gold standard was suspended. For a time there was a cessation of redeeming currency in gold, and further retaining of gold both in coin and bullion was prohibited. At the same time gold exports were forbidden. Then in May Congress declared every kind of money to be legal tender. A month later legislation was enacted suspending the requirement of gold payment in contracts. On January 30, 1934, a law was enacted stabilizing the dollar between 50 and 60 cents on the basis of the present gold value. A fund of two billion dollars was set aside, to keep the dollar stable. In May, 1934, a Senate bill was passed which declares an 'ultimate objective' of a monetary base of 25% silver and 75% gold. The bill included a recommendation of international agreement for coördinated use of silver and gold as a monetary standard. See MINTING.

**Coin Collecting.** See NUMISMATICS.

**Coir**, the fibre of the husk of the coconut, used in the manufacture of cordage, matting, etc. Coir is obtained by soaking the husk of the coconut in water for several months, when it is beaten with a stick and rubbed, until the connecting tissue is completely separated from the fibres. See COCOANUT.

**Coire** (German *Chur*, or *Cur*; Rumonsch, *Cuera*), capital of the Swiss canton of the Grisons, the *Curia Rhætorum* of the Romans, on the Plessur, in the valley of the Upper Rhine. The old part of the town, partially walled, is still very quaint and mediæval. It has an old Romanesque cathedral, partly of the 8th century, an ancient chapel, and a library of 80,000 volumes. The meeting point of routes through several Italian passes, it is an active trading center. It stands (alt. 1,952 ft.) 74 m. by rail s.e. of Zürich; in summer it is much frequented by tourists. The bishop's see dates from the 4th century; p. 12,000.

**Coit, James Milnor** (1845-1925), Am. ed-



### COLOR PRINTING OF A RUG

This reproduction was made directly from the rug by the "Colortype" process in three colors, each color photographed separately through a "Ray" filter, and each color negative made into a single halftone printing plate. These plates are printed with primary color inks in above indicated succession over each other with final result in the lower right-hand corner. Note the difference in tone values in the yellow, red and blue impressions.

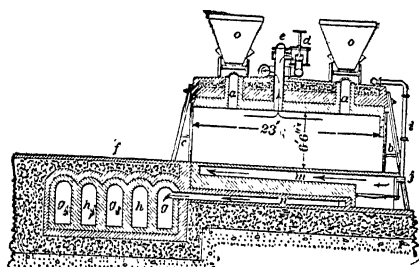
This three-color process printing has been used in making the frontispieces and various other color plates in these volumes.



uator, was born in Harrisburg, Pa. In 1876 he became master of mathematical sciences at St. Paul's School, Concord, N. H. Dr. Coit invented a number of new appliances in chemical apparatus, and published *Manual of Chemical Arithmetic* (1886); *Qualitative Analysis* (1895); *Treatise on the X-Rays* (1897); *Liquid Air* (1899).

**Cojedes**, a state of Venezuela, embraces 5,713 sq. m., and its great plains are devoted chiefly to the raising of cattle, horses, and mules, and to general agriculture. Its capital is the ancient city of San Carlos; p. 95,000.

**Coke** is the solid residue of bituminous coal from which the volatile portions have been driven. It was first made about 1735 in England to supplement charcoal for smelting iron, and by 1750 its use had extended considerably. In 1825 the necessity for coke was felt in America. Good coke is usually bright



Coke Oven.

*o, o*, Charging cars; *a, a*, charge ports; *b, c*, end oven doors; *e, d*, gas outlet and valve; *f, f*, quenching platform; *g, g*, flues for pre-heating air supply; *h, h*, smoke and waste gas flues; *i, j*, fuel gas supply pipe and nozzle.

and silvery, hard and strong, though light and porous. The cells comprise 50 per cent. or more of the volume, and promote rapid combustion. The coal used must contain enough pitch to fuse together the solid particles. Generally, metallurgical coke is made from coal with a small amount of pitch, while gas-coke residue comes from coal with a maximum amount. A coal with foreign matter, as slate and iron pyrites, must be cleaned before coking.

The first step in the manufacture of coke is crushing; and this is advisable, even with good coals, for rapid and uniform coking. The second step is 'classifying'—separation and collection by size of particles, as by screening. The third step is 'washing.' The

first kilns were simple open-top masonry enclosures, but they soon gave way to the 'beehive' oven. As now used, the latter is made of silica brick, and is about 12 ft. in diameter by 7 ft. high, with a small front door. The ovens are massed to prevent undue heat loss. About six tons of coal is delivered through a hole in the dome, making a layer some 2 ft. thick. The charge is ignited by the hot walls, and burns on the top. When distillation is complete the coke is quenched by a stream of water sent through the door. This process is cheap. The average yield of coke from a beehive oven is about 65 per cent. the weight of coal used.

The Retort or By-Product Oven has been greatly developed in the last decade, so as to eliminate waste; and this development has been helped by the presence of deposits of coal low in volatile matter and requiring a quick heat to be successfully coked. The retort oven is essentially a narrow chamber with full end doors and three to six small holes in the roof for charging. In the side walls and floor are the heating flues, wherein is burned part of the gases distilled off. The charge is tightly sealed against air, and the gases are led away from 25 to 50 ovens in a block. The gas is cooled in regenerators which pre-heat the air supply of the ovens. Further cooling deposits some tar and ammonia, and the rest is removed by bubbling or paddle-wheel washers. To extract benzole (see BENZENE) and cyanides, washers are used with heavy oils of tar or petroleum, and with an alkaline solution of iron sulphate, respectively. The yield of coke from a retort oven averages about 75 per cent. the weight of coal used. See GAS. During World War II the output of coke and its chemical by-products rose to record heights.

**Coke, Sir Edward** (1852-1934), English lawyer and public official, was born in Mileham, Norfolk. He was chief justice of the Common Pleas and chief justice of the King's bench. Coke became one of the leaders of the growing Parliamentary opposition. He took a considerable share in drawing up the Petition of Right (1628), but retired from Parliament in 1629. His writings, despite their fame, are characterized more by learning, minuteness, and enthusiasm than by order, principle, or method. They are *Institutes of the Laws of England*, in four parts—(1) *A Commentary upon Littleton*; (2) *Exposition of Statutes*; (3) *Pleas of the Crown* (i.e., Crimes); (4) *The Jurisdiction of Courts* (1628-44); *Complete Copyholder*

(1630). Consult *Lives* by Woolrych and Johnson.

**Cola Nut.** See **Kola Nut.**

**Colberg.** See **Kolberg.**

**Colbert, Jean Baptiste** (1619-83), son of a wool merchant in Rheims, became one of the greatest of French financiers. On the dismissal of Fouquet, Colbert was appointed (1661) superintendent of finances. His first measure was the reduction of the *taille*, a direct property tax. Then he introduced system and economy into the exchequer by bringing the farmers of the taxes to book; and in a few years, while remitting taxes, he actually increased the net revenue of Louis XIV. from 84 million to 114 million livres, while the expenses of collection diminished from 52 millions to 23 millions. Colbert undertook the reorganization of the commercial policy of the country, endeavoring to encourage manufactures and shipbuilding at home by a system of protection and of bounties, and reforming the administration of the colonies. He was carried too far in his zeal for method, and it was he who elicited the famous phrase '*Laisses faire.*' He gave French industry its bias toward the production of articles of luxury and taste. He bestowed great care upon the national cultivation of the arts and the sciences, and encouraged them by founding academies. To him also belongs the credit of having virtually laid the foundation of the French navy. He greatly improved the means of communication in France. But when the extravagance of Louis XIV. took the form of military expenditure, Colbert saw his system nullified and is said to have died of a broken heart at the ingratitude of the king. Consult *Lives* in French, by Neymarck and Dussieux; Clément's *Lettres et Mémoires de Colbert*.

**Colby, Bainbridge** (1869- ), American lawyer and public official, was born in St. Louis, studied at Williams College, Mass., and the Columbia and New York Law Schools. He acted as counsel in celebrated law-suits and served in the N. Y. Assembly 1901-2. During the World War he was connected with the U. S. Shipping Board, accompanied the American Mission to negotiate Peace in Paris, 1919, and was appointed Secretary of State in President Wilson's Cabinet, March, 1920.

**Colby, Frank Moore** (1865-1925), American editor, born in Washington, D. C. He was associated with several encyclopædic works; was an editor of the *New International Encyclopædia* (1900), and of *Nelson's*

*Encyclopædia* (1905-6). He published *Outlines of General History* (1900); *Imaginary Obligations* (1904); *Constrained Attitudes* (1911).

**Colby College**, a Baptist institution at Waterville, Me., chartered in 1813 as the Maine Literary and Theological Institution. The name was changed to Waterville College in 1821, and to Colby University in 1867 in recognition of aid given by Gardner Colby of Boston.

**Colchagua**, province, Chile, extending from the Andes to the Pacific. Stock raising and mining are the chief industries. Area about 5,365 sq. m.; p. 336,686.

**Colchester**, municipal and parliamentary borough, market town, and port, in Essex, England, is on the River Colne, 12 m. from the sea. Remains of the largest Norman castle in England, built in the reign of William Rufus, still survive. The town is the center of a large agricultural district, and has considerable shipping trade. The principal exports are grain and malt. There are extensive oyster beds on the coast at the mouth of the Colne; p. 43,393.

**Colchester, Charles Abbot**, First Baron (1757-1829), English statesman, was born in Abingdon. He was sent to Parliament as a Tory in 1795. His chief service was the introduction in 1800 of the first Census Act. He was Speaker of the House of Commons (1802-16).

**Colchicum**, a genus (containing about 30 species) of autumnal-blooming, liliaceous plants, belonging to the Hellebore family, and popularly known as Meadow Saffrons or Autumn Crocus. It is a drug, which, like the seeds, is emetic, cathartic, and sedative. Its principal use in medicine is in acute gout, in which condition it is thought to assuage the pain.

**Colchis**, region of Asia, bounded on the w. by the Black Sea and on the n. by the Caucasus, now known as Mingrelia and Ieredia. It is famous in Greek legend in connection with the story of the Argonauts. Mithridates made it part of his kingdom (about 100 B.C.). The Romans defeated him, and overran it (72-66 B.C.), but did not conquer it until the time of Trajan.

**Colcothar** (*Chalcitis*, *Crocus Martis*;  $\text{Fe}_2\text{O}_3$ ), the residuum of brownish red ferric oxide, after the distillation of acid from ferrous sulphate (green vitriol). It is used as paint (Indian red) and, when pulverized, for polishing glass.

**Cold Cream** consists of white beeswax,

spermaceti, oil of almonds, rose-water, and otto of rose to perfume it. This preparation is in great favor as an emollient application for the face and hands.

**Colden, Calwallader** (1688-1776), American colonial governor and naturalist, was born in Dunse, Scotland. He was an active Royalist, and incurred the hostility of the New York patriots. He was also a diligent student of botany, and introduced the Linnaean system into America, sending to Linnaeus descriptions of many American plants. He wrote a *History of the Five Indian Nations of Canada* (1727).

**Cold Frame.** See **Hot-Bed**.

**Cold Harbor**, a locality in Hanover co., Virginia, the scene of two battles during the Civil War. The first was fought on June 27, 1862, and is more generally known as the Battle of Gaines' Mill.

The second battle was fought during Grant's final campaign against Lee, on June 3, 1864. Lee, with a force greatly inferior to that of Grant, had occupied a nearly impregnable position at Cold Harbor, though much of his first line was captured by an assault on June 1. Grant, nevertheless, decided to assault rather than to try to dislodge his opponent by a flanking movement, and at 4:30 A.M. on June 3 the assault was made 'all along the line.' The Federals attacked with great bravery, but were repulsed with fearful loss—estimated at 7,000 in killed and wounded, the Confederate loss being relatively small. Between June 1 and June 12 the Federals lost, in killed and wounded, about 15,000 men, the Confederates about 2,000. The assault of June 3 has been regarded as the greatest blemish on General Grant's military career, and he himself, in his *Memoirs*, says: 'No advantage whatever was gained to compensate for the heavy loss we sustained.'

**Cold Storage.** See **Refrigeration**.

**Cold Wave** is caused by a cool or cold wind blowing equatorward, following in the wake of a cyclonic storm. In the United States it is the name applied to a fall of temperature lower than 32° F. in the n.w., or lower than 40° F. in the s., affecting an area of not less than 50,000 sq. m., with a change of at least 20° in twenty-four hours.

**Cole, Sir Henry** (1808-82), English administrator and art critic, born at Bath. He founded the S. Kensington Museum, of which he was appointed director in 1860; helped to organize the Great Exhibition of 1851; originated the first Christmas card.

**Cole, Thomas** (1801-48), American painter, was born at Bolton-le-Moore, England, and emigrated to Ohio in 1819 with his father. He studied under a local artist, and removed to New York in 1825, where he joined the group of artists headed by Durand and Trumbull. Mr. Cole became a landscape painter, and his best works are scenes along the Hudson R. and among the Catskills.

**Cole, Timothy** (1852-1931), American wood-engraver, was born in London, England, whence he was brought by his parents to America in 1857. After several years' residence in Chicago, he removed to New York in 1871 and became associated with *Scribner's Monthly* (now the *Century Magazine*). He was commissioned by the *Century Magazine* in 1883 to execute engravings of the paintings of the old masters in Europe. His series of engravings, which appeared in that periodical, include *Old Italian Masters* (1892), *Dutch and Flemish* (1896), *English* (1900), and *Old Spanish*.

**Colebrooke, Henry Thomas** (1765-1837), British Sanscrit scholar, born in London. He entered the service of the E. India Company in 1782. His career is notable for the stimulus given to the study of Sanscrit and its literature, whereof he was the European pioneer.

**Colectomy**, the operation of removing part of the colon. This is sometimes done in cases of tumor, strangulation, or stricture. The upper portion of the bowel is either reunited to the lower or attached to an opening in the abdominal wall (enterostomy).

**Coleman, Leighton** (1837-1907), American P. E. prelate, born in Philadelphia, Pa., was elected and consecrated bishop of Delaware in 1888. He published *History of the Lehigh Valley* (1872), *The Church in America* (1895), and *History of the Church in the United States* (1901), besides numerous sermons and essays.

**Coleman, William Tell** (1824-93), American pioneer and merchant, born in Harrison co., Ky. He emigrated to California in 1849. He is remembered chiefly as the president of the famous Vigilance Committees of 1852 and 1856 in San Francisco.

**Colenso, John William** (1814-83), English mathematician, and harbinger in England of the modern 'higher criticism' of the Bible, was born at St. Austell, Cornwall. His mathematical textbooks were published as follows: *Arithmetic* (1840), *Algebra* (1841), and *Plane Trigonometry* (1851). In 1862 the

bishop began the publication of his chief work in Biblical criticism, *The Pentateuch and the Book of Joshua Critically Examined*, completed in 1879. This treatise excited a storm of theological controversy almost unparalleled, although its scientific conclusions are now generally accepted.

**Coleoptera**, an order of insects which includes not only all beetles, but also such forms as glowworms, 'ladybirds,' weevils, cockchafers, and others not always recognized as close allies of the beetles. Characteristic are the hard elytra or wing-covers.

**Coler, Bird Sim** (1867), American politician, born at Champaign, Ill. As comptroller of New York city (1898-1901) he attracted general attention by his opposition to measures of the Van Wyck administration and to policies of Tammany Hall, with which he had been identified. He published *Municipal Government, as Illustrated by the Charter, Finances, and Public Charities of New York* (1900). Deceased.

**Coleridge, Hartley** (1796-1849), English poet, biographer, and essayist, eldest son of Samuel Taylor Coleridge, born at Clevedon, Somersetshire. As a poet his fame rests on a few great sonnets; but in all his verse there is a tender grace, united to a singular purity of feeling and expression. His brother, Derwent Coleridge, collected his scattered writings, and in 1851 published two volumes of *Poems* (with a Memoir), and two volumes of *Essays and Marginalia*.

**Coleridge, Herbert** (1830-61), English scholar and philologist, son of Henry Nelson Coleridge and Sara Coleridge. He may be regarded as one of the founders of the *New English Dictionary*, of which (see Preface) he was the 'first general editor.'

**Coleridge, Sir John Duke**, First Baron COLERIDGE (1820-94), English judge, eldest son of Sir John Taylor Coleridge, born at Heath Court, Ottery St. Mary. He was called to the bar in 1846. In 1880 he succeeded Sir Alexander Cockburn as lord chief-justice of England. His great forensic triumph was his prolonged cross-examination of the 'claimant,' Arthur Orton, in the Tichborne case (1871-2), and his opening speech for the defendant, which lasted twenty-three days.

**Coleridge, Samuel Taylor** (1772-1834), English poet, philosopher, and critic, born at Ottery St. Mary, Devonshire, son of the Rev. John Coleridge (1719-81), vicar of the parish. In the summer of 1790 he swam the New River in his clothes, caught rheumatic fever, and was confined for some months to

the sick-ward of the hospital. This illness, and, as may be conjectured, doses of opium administered to allay the 'seas of pain' (see his sonnet *To Pain*), affected the whole of his after life. In June of the year 1794 he visited Oxford, where he made friends with Robert Southey. Six weeks later a second meeting took place at Bristol, where Southey introduced Coleridge to the widow and daughters of a tradesman named Fricker. One of the daughters (Edith) was betrothed to Southey, and Coleridge became engaged to her elder sister (Sarah), whom he married October 4, 1795. *The Ancient Mariner* was begun in November, 1797, and *Christabel* (part i.) and *Kubla Khan* were written in 1797-8. In the summer of 1797 Wordsworth and his sister Dorothy settled at Alfoxden, a large manor-house three miles from Stowey. In January, 1798, Coleridge was nominated minister of the Unitarian chapel at Shrewsbury, but resigned the appointment out of regard to the wishes of the brothers Josiah and Thomas Wedgwood, who settled on him an annuity of £150 on the understanding that he should devote his time and talent to literature. The end of the Stowey period is marked by the publication of the first edition of the *Lyrical Ballads* (see WORDSWORTH, WILLIAM), to which Coleridge contributed four poems. On Sept. 16, 1798, Coleridge left England for Germany in company with the Wordsworths. He returned to England in July, and in November to December accompanied Wordsworth on a walking tour through the Lake District. In 1800 he devoted himself to the translation of the second and third parts of Schiller's *Wallenstein*. In order to be near Wordsworth, who had taken a cottage at Grasmere, Coleridge settled with his family at Keswick, in a newly-built house named Greta Hall (1800). In the autumn of this year he wrote the second part of *Christabel*, and assisted Wordsworth in preparing a second edition of the *Lyrical Ballads*.

The wet climate of Keswick increased an inherited tendency to rheumatic gout and cognate maladies. Severe pain and constant malaise resulted in habitual resort to opium, which weakened the bodily, if not the mental powers, and made regular work all but impossible. Domestic unhappiness—in part, but not wholly, his own fault—was perhaps his crowning misfortune. A change both of scene and of climate seeming imperative, he went to Malta (1804), where he remained as secretary to the governor until 1805. On

returning to England in 1806 he wrote for the newspapers, and did not rejoin his family till the middle of October. *Christabel*, *Kubla Khan* (1798), and *The Pains of Sleep* (1803) were published in pamphlet form by Murray (1816). The *Table Talk* (2 vols. 1835) is a record of conversations between the poet and his son-in-law. In 1828 and 1829 collected editions of Coleridge's *Poetical Works* were issued, and in 1830 a pamphlet *Or. the Constitution of Church and State*. For the last three or four years of his life he was, 'with few and brief intervals, confined to a sick-room.' He died July 25, 1834. For the biography of S. T. Coleridge, see *Samuel Taylor Coleridge: a Narrative*, by James Dykes Campbell, 1894 (for authorities, see p. ix); an estimate of Coleridge by Emerson in his *English Traits*; *Letters of Samuel Taylor Coleridge*, 2 vols. 1895 (for authorities, see vol. i., pp. xiii, xiv). Compare also Barnett, *Coleridge* (ib., 1904); and J. L. Lowes, *The Road to Zanadu* (1928).

**Coleridge, Sara** (1802-52), daughter of Samuel Taylor Coleridge; born at Greta Hall, Keswick. In 1843 she took up the task of editing the works of her father. With this end in view she wrote, among other things, the Introduction, Notes, and (in part) the Biographical Supplement to the second edition of *Biographia Literaria* (2 vols. 1847); and the Introduction and Notes to *Essays on his Own Times* (3 vols. 1851).

**Coleridge-Taylor, Samuel** (1875-1912), musical composer of Anglo-African descent, born in London. Perhaps his most successful work is his choral-orchestral composition, *Scenes from the Song of Hiawatha*. In 1902 his *Blind Girl of Castel-Guillé* was produced, and in 1903 his cantata *The Atonement*. He published numerous songs.

**Colet, John** (1467?-1519), dean of St. Paul's, born at London, founded and endowed St. Paul's School. He wrote *Rudimenta Grammatices*, *Epistolæ ad Erasmus*, and other works. See Seebohm's *Oxford Reformers* (3rd ed., London, 1887), and Rev. J. H. Lupton's *Life of Colet* (2nd ed., 1909).

**Colet, Louise** (1810-76), French author, born at Aix, won four times the prize for poetry given by the French Academy. She wrote a part of her autobiography in the novel *Lui* (1859), disclosing her relations with Alfred de Musset. Among her works in verse are *Fleurs du Midi* (1836); *Ce qui est dans le Cœur des Femmes* (1852); *Le Poème de la Femme* (3 vols. 1853-6). Among her works in prose are *Cœurs Brisés* (1843);

*Folles et Saintes* (1844); *Ces Petits Messieurs* (1869), one of her best books; and *Les Dévotes du Grand Monde* (1873).

**Coleus**, a genus of tropical labiate shrubs and herbs, natives of Asia and Africa. They are grown in greenhouses, chiefly for their brilliant foliage.

**Colfax, Schuyler** (1823-85), American political leader, born in New York city, a great-grandson of Gen. Philip Schuyler. He became prominent, first as a Henry Clay Whig, and after 1854 as a Republican, in politics. From 1869 to 1873, during the first administration of Pres. Grant, he was vice-president of the U. S.

**Colgate, James Boorman** (1818-1904), American financier and philanthropist, son of the founder of a great soap and perfumery company, and brother of Samuel Colgate, was born in New York City. He jointly, with his brother Samuel, gave largely to Madison University at Hamilton, N. Y., the name of which institution was changed to Colgate University in their honor in 1890. Mr. Colgate was of great assistance to the U. S. government in financial matters during the Civil War.

**Colgate University**. A Collegiate institution at Hamilton, N. Y., founded by the Baptist Education Society in 1819 as the Hamilton Literary and Theological Institution and at first restricted to students for the ministry. In 1846 it was rechartered as Madison University, the present name being assumed in 1890 in recognition of a family of benefactors.

**Colic**, a severe griping abdominal pain, spasmodic in character, generally relieved by heat, and unaccompanied by rise of temperature. *Intestinal colic* or *enteralgia*, is produced by the spasmodic efforts of the intestinal muscular fibers (exaggerated peristalsis), excited by irritation, obstruction, or cold, and may arise from various causes, of which imperfect or deranged digestion is the most frequent. Colic is especially common in children. In their case, the position with legs flexed on the abdomen, cries of pain, and absence of fever will suggest the condition.

**Coligny, Gaspard de** (1517-72), French admiral, was born in Chatillon-sur-Loing, 3d son of the Marechal de Chatillon and his wife Louise de Montmorency, sister to the famous duke and constable of that name. He served in Italy under Francis I., and was made (1547) colonel-general of infantry by Henry II., in which capacity he remodelled the military system. He was created admiral of France in



1552. Coligny, by his high character and his abilities succeeded, in conjunction with the heads of the Bourbon family, in effecting the treaty known as the 'Pacification of Amboise' (1563), by which the Huguenots were allowed freedom of worship. This concession having been gradually withdrawn by the queen-mother, Catherine de' Medici, the second Huguenot war broke out in 1567, and, on the death of the prince of Conde, Coligny was appointed generalissimo of the forces of Henry of Navarre. Peace was concluded in 1570. Opponents of Henry, however, again becoming alarmed at the ascendancy of Coligny over the young king, Charles ix., launched the attack. Coligny was murdered in his bed, the first victim of the so-called massacre of St. Bartholomew. Consult biographies by Blackburn, Bersier, Delaborde, and Whitehead (1904).

**Colitis**, inflammation of the mucous membrane of the colon. See ENTERITIS; DIARRHŒA.

**Collaboration** (Lat. *con*, 'with'; *laborare*, 'to work'), the united labor of two or more persons in an artistic production. The term is usually confined to conjoint effort in literary work, as the partnership of Charles Reade and Dion Boucicault in *Foul Play*. The most famous of all collaborations is that of Beaumont and Fletcher. The collaboration of the French writers Erckmann and Chatrian is also notable.

**Collagen**. See ALBUMINOIDS.

**Collapse**, a condition of complete nervous exhaustion. It precedes death in certain exhausting diseases, such as cholera; it may follow upon severe hæmorrhage, traumatism even without great loss of blood, deep or widespread burns, and great mental shock, and it results from certain poisons.

**Collar Bone**. See CLAVICLE.

**Collaterals**, and **Collateral Relations**, terms used synonymously in law to describe persons who are descendants from a common ancestor, but not in the same direct line of descent, and who, therefore, do not bear the relationship of ancestor and descendant as to each other. Brothers and sisters, cousins, aunts and uncles by blood relation, and nephews and nieces of a given person are collateral relations; whereas his children and grandchildren are known as *lineal* descendants.

**Collateral Security**, sometimes spoken of simply as collateral, is property transferred or delivered, or a separate obligation given to secure or guarantee the payment of a debt or performance of an obligation. The term is most commonly used to designate a delivery or transfer of negotiable paper, bonds, stocks

and other securities for the above purpose; but is also properly applied to a pledge of personal property. See GUARANTY; MORTGAGE; WARRANTY.

**Collect**, a short prayer used in the services of the Roman Catholic Church and the Anglican communion, proper to the day or to some special object.

**Collective Bargaining**. See TRADE UNIONS.

**Collectivism**, a term expressing the central idea in the economic theory of socialism, that industry should be carried on with a collective capital, not owned and controlled by individuals, but by groups of associated workers. See SOCIALISM.

**College**. The term college (*collegium*) in its Roman significance denoted any association of persons organized for a specific purpose—mercantile, religious or political. In modern use generally, however, the word college denotes an institution of higher learning. In England it is applied usually to the sub-corporation of a university—as Trinity College, Cambridge, Balliol College, Oxford, etc. In the United States and Canada, as in Scotland, the distinction between the college and the university is less clear than in England. In general it may be said that the term college covers all institutions of higher learning, while university is restricted to institutions offering graduate work and having affiliated professional schools. See UNIVERSITY and articles on the various colleges and universities of the world.

**Collège de France, The**, founded at Paris about 1530 by Francis I., to further the study of languages and oppose the prevailing scholasticism of the university. Originally only two lecturers were appointed, Greek and Hebrew; but Latin was added in 1534, and the institution was then known as the Collège de Trois Langues. Medicine, botany, Arabic, Syriac, literature, law, and various sciences were added under successive monarchs, until now there are forty-two chairs, and the curriculum embraces the whole field of human knowledge. Consult Lefranc's *Histoire du Collège de France* (1892).

**Collegia Nationalia**, or **Pontificia**, several schools at Rome in which pupils of various nationalities are specially trained for spreading the Roman Catholic faith after their return to their native countries. The first college of this kind, the Collegium Germanicum, was founded by Ignatius Loyola in 1552, and reorganized in 1573 by Pope Gregory XIII.

**Collegiate Church** differs from a cathedral in that it is not the seat of a bishop; it is

served by a body of canons, or, in the Anglican Church, by a dean, provost and canons, living together in collegia. It is under the jurisdiction of the bishop of the diocese, who is the 'visitor' of the foundation; in the Roman Catholic Church no collegiate church can be established save with the express sanction of the Pope. The name is sometimes given to a church with an associated body of clergy or several church buildings, like the Collegiate Reformed Dutch Church of New York City.

**Colleoni, Bartolomeo** (1400-75), Italian mercenary commander, born at Solza, near Bergamo. His statue by Verrocchio, considered the finest equestrian statue in the world, stands in a square in Venice. See Bonomi's *I Conti Martingengo-Colleoni* (1884).

**Colles's Fracture**, a common fracture of the radius, above the wrist; is usually the result of a fall on the palm of the hand. It is diagnosed by the history, by finding a tender point a little above the wrist, on the thumb side, with the alteration in the relative position of the two prominent styloid processes of the wrist. The process on the radial side is normally lower than that on the ulnar side. Colles's fracture brings the two bones much to the same level; their relative positions can be compared with those on the other wrist.

**Collett, Jacobine Camilla**, *nee Wergeland* (1813-95), Norwegian author, sister of the poet Henrik Wergeland. Her literary life began with the publication of her novel *Amtmandens Dotre* (1855), which in essence is a sharp attack on the demoralizing habit regarding marriage as a 'woman's sole bread-winning business,' and is remarkable not only for its clear-cut, brilliant style, but also for its realistic description of Norwegian domestic life.

**Colletta, Pietro** (1775-1831), Italian historian, statesman, and general, born at Naples. During a sojourn at Florence he wrote *Storia del Reame di Napoli dal 1734 sino al 1825* (1st ed. 1834; Eng. trans. by Horner, 1858), the materials for which were collected with the greatest care, and it remains the standard work on the subject.

**Collie, The Scotch**. The Scotch collie perhaps enjoys more favor than any other dog. His intelligence is only realized when one sees a well-trained collie collecting sheep, detecting and expelling strangers, and, finally, folding the flock. He exhibits the same intelligence in his amusements, and combines with it an affection and an exuberance of spirits that compel sympathy. The assertion, sometimes made, that the collie is treacherous, has no foundation

in fact. See R. Lee, *The Collie or Sheepdog* (1890).

**Collier, Jeremy** (1650-1726), English non-juring bishop and controversialist, born at Stow Quay, Cambridgeshire. In 1698 he published his *Short View of the Immorality and Profaneness of the English Stage*, in which he severely attacked Dryden, Wycherley, Congreve, and other dramatists of the time. The work caused an immense sensation, doing much to bring about the reformation of the stage. Efforts were made to answer him, but unavailingly; and Dryden, in the preface to his *Fables*, issued in 1700, confessed that in many things his critic had justly reproved him, though he had misrepresented him in others.

**Collier, John Payne** (1789-1883), English Shakespearean scholar and bibliographer, born in London. In 1852 he stated that he had become possessed of a copy of the Shakespeare folio edition of 1632, on the margins of which were written notes evidently dating back to the middle of the 17th century. The alleged discovery produced a great sensation in England, Germany, and the United States. In the end leading authorities on the text pronounced the notes to be forgeries. He published a valuable edition of Spenser's Works (1862).

**Colliery**. See **Coal-mining**.

**Collimation**, a mode of telescopic adjustment by which the optical axis, or line of sight, is rendered strictly perpendicular to the axis of movement.

**Collimator**, an auxiliary telescope for determining collimation error.

**Collingwood**, town and port, Ontario, Canada. A government fish hatchery and rifle range are located here; p. 7,977.

**Collingwood, Cuthbert, Lord** (1750-1810), British admiral, was born in Newcastle-on-Tyne. Sent to sea at the age of eleven, his life was spent almost wholly on board ship. He first saw service in the American Revolutionary War, and fought on shore at the Battle of Bunker Hill (1775). From 1778 his career was closely connected with that of Lord Nelson whom he followed up the ladder of promotion step by step, until Nelson's death left the top-most round vacant for him. Among the naval victories in which Collingwood bore a part were those of Lord Howe off Brest in 1794; of Lord Jervis off Cape St. Vincent in 1797; and of Trafalgar in 1805, where he held the second command, until Nelson had received his death wound, when he assumed the chief direction.

**Collins, Anthony** (1676-1729), English

deist, was born in Heston, near Hounslow, and became the disciple and friend of John Locke. Collins was a philosophical Necessitarian, and advocated his opinions in his *Philosophical Inquiry Concerning Liberty and Necessity* (1715). In 1713 he published his *Discourse on Free Thinking*, the best known and the most important of all his works.

**Collins, [Archie] Frederick** (1869), American physicist, was born in South Bend, Ind. He has made important researches concerning the effect of electric waves on brain cells, and was the first person (1899) to apply the direct current arc to wireless telephony for which he was awarded a gold medal at the Alaska-Yukon-Pacific Exposition (1909).

**Collins, James Franklin** (1863), American botanist, was born in North Anson, Me. He became forest pathologist in the U. S. Department of Agriculture. He wrote *Practical Tree Surgery*, and collaborated in the authorship of *Key to New England Trees*, *The Control of the Chestnut Bark Disease*, etc. Deceased.

**Collins, John Churton** (1848-1908), English man of letters, was born at Bourton-on-the-Water, Gloucestershire. His works include *Sir Joshua Reynolds as a Portrait Painter* (1874); *Studies in Shakespeare* (1903); *Rousseau and Voltaire* (1908).

**Collins, Joseph** (1866), American neurologist, was born in Brookfield, Conn. He was president of the American Neurological Association in 1902-3. His published works include: *Diseases of the Brain* (1899); *The Faculty of Speech* (1900); *Diseases of the Nervous System* (1900); *Pathology of Nervous Diseases* (1901); *The Sympathetic Nervous System*.

**Collins, Joseph William** (1839-1904), American pisciculturist, was born in Isleboro, Me. In 1880 he became U. S. Fish Commissioner, a post which he held until 1892. He was connected with various commissions; received many medals and diplomas, including an honor medal (1893) as 'one of the makers of the World's Columbian Exposition.'

**Collins, William** (1721-59), English poet, was born in Chichester. His fame is principally founded upon his *Odes*. The *Ode on the Popular Superstitions of the Highlands of Scotland* is a poem in which, according to James Russell Lowell, 'the whole Romantic School is foreshadowed.'

**Collins, William** (1788-1847), English landscape and figure painter, was born in London. In 1812 his *Sale of the Pet Lamb* was sold for \$700, and from this time his pictures became popular. The best known are *Scene*

*on the Coast of Norway* (1815) and *Early Morning* (1846).

**Collins, William Wilkie** (1824-89), English novelist, born in London, eldest son of William Collins the painter. He became associated with Dickens, first upon *Household Words* (1855), and then on *All the Year Round* (1859). Other works are *The Woman in White* (1860); *The Moonstone* (1868); *The Legacy of Cain* (1888).

**Collinsia**, a genus of annual flowering plants belonging to the order Scrophulariaceæ, and popular as garden plants. The flowers are in whorls, are two-lipped, and have a wide range of color.

**Collinson, Peter** (1694-1768), English naturalist and botanist, was born near Windermere. He founded a botanic garden at Mill Hill, and improved the English system of agriculture by introducing foreign methods and products. He sent English plants to America, and introduced many species of American plants into England. He established an acquaintance by correspondence with Benjamin Franklin, which ripened into a lifelong friendship.

**Collision Bulkhead.** See **Bulkheads**.

**Collisions at Sea.** A collision at sea between two ships may happen—(1) when neither party is to blame, in which case the misfortune must be borne by the person on whom it has happened to fall; (2) when both are in fault and there has been negligence on both sides, in which case the law is that the loss must be apportioned between them; (3) by the misconduct of the suffering party only, and then the sufferer must bear his own burden; and (4) when it has been the fault of the ship which ran the other down, and in that case the injured party is entitled to compensation from the other. A maritime collision may also take place upon inland waters. Under the Constitution of the United States, all such actions are brought in the Federal courts. For the rules to prevent collisions at sea, see **RULE OF THE ROAD**.

**Collisions on Land** are subject to the general rules of negligence and liability for such. See **RULE OF THE ROAD**; **RAILROADS**; **WRECK**.

**Collodion** (Greek *kollao*, 'I stick') is a colorless, somewhat viscid liquid obtained by dissolving the lower nitrates of cellulose in a mixture of ether and alcohol. Cotton itself is not soluble in alcohol or ether; but when treated in the form of cotton wool, rags, or paper with a mixture of five parts of strong nitric acid and six of sulphuric acid, it can be

dissolved in ether, or in a mixture of ether and alcohol. To this modification the name pyroxilin is applied.

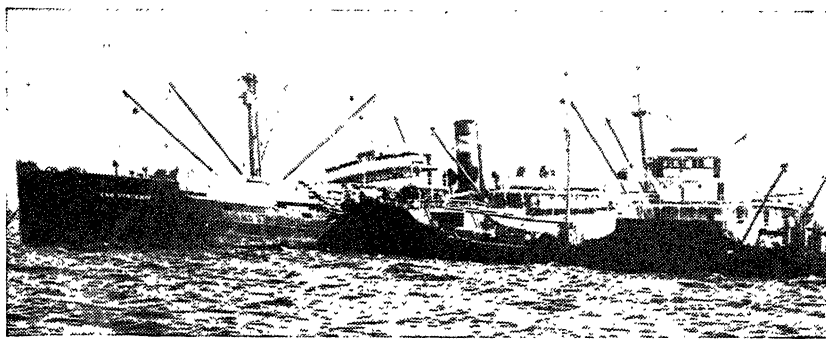
There are many varieties of collodion, divisible into surgical or medicated collodions and photographic collodions. As an application to wounds, it is employed to keep the edges close together. In photography it is used in the manufacture of films.

**Colloids**, a term first used in 1861-4 by Thomas Graham, an English chemist, in the course of his studies on dialysis, to describe various mucilaginous substances, as gelatine, glue, and starch, which in solution were either incapable of diffusion through organic membranes or diffused at a very slow rate. Later investigations proved that this property is not limited to any definite class, but under proper conditions may be exhibited by practically all

microscopic or ultra-microscopic methods, the mixture is a true solution.

The principles of colloidal chemistry find a wide application in science and the industrial arts. These principles are of special importance in biology and biochemistry, as most of the products which are active in life processes are to be found in the living organism in the colloidal state. Among the arts and industries in which they play an important role are photography, metallurgy, ceramics, tanning, brewing, dyeing, sewage and water purification, the manufacture of soap, rubber, paper, artificial silk, celluloid, sugar, explosives, metallic mirrors, tungsten lamps, cement, and varnish, and the various cooking processes.

**Bibliography.**—Consult R. Zsigmondy's *Colloids and the Ultra-microscope* (Eng. trans., 1909); K. Arndt's *Popular Treatise on the*



*Freighters Collide in Chesapeake Bay.*

substances. The terms Colloid and Colloidal, therefore, like the terms gaseous, liquid, and solid, have come to denote not a form of matter, but a state. Colloidal solutions in which the particles of colloid matter are highly dispersed so that the solution is in a fluid state are known as sols; those which occur in a gelatinous state are known as gels.

Colloidal solutions merge on the one hand into true or homogeneous solutions, and on the other into suspensions. In general, when the mixture of solid and liquid is of such a character that it is evident the solid will eventually settle out, as in a mixture of fine sand and water, it is known as a suspension; when the dispersed particles are so fine that they will not settle out, and yet not so fine but that their size can be estimated by appropriate methods, the mixture is known as a colloidal solution; and when the particles are so infinitesimal as to be no longer discernible by

*Colloids in the Industrial Arts* (Eng. trans., 1914); Ostwald and Fischer's *Handbook of Colloid Chemistry* (1915); W. W. Taylor's *The Chemistry of Colloids* (1915); E. Hatschek's *Introduction to the Physics and Chemistry of Colloids* (2d ed., 1916); E. F. Burton's *Physical Properties of Colloidal Solutions* (1916).

**Collot d'Herbois, Jean Marie** (1750-96), French revolutionist, was born in Paris. A provincial actor, he was attracted by the Revolution to Paris, where his impudence, his loud voice, and his *Almanach du Pere Gerard* secured him his election for Paris to the National Convention. In 1793 he became president of the Convention, and a member of the Committee of Public Safety.

**Collotype** is a method of printing illustrations of books. It is a modification of the gelatin process.

**Collusion** signifies a fraudulent scheme entered into by two or more parties, to deprive

others of their legal rights, or to interfere with the course of justice. A common form is where spouses make agreement whereby one of them shall illegally sue for divorce.

**Collyer, Robert** (1823-1912), American clergyman, was born in Keighley, Yorkshire, England. In 1859 he joined the Unitarian Church. He removed to Chicago, and there founded the Unity Church, of which he was pastor from 1860 to 1879, when he accepted a call from the Church of the Messiah in New York City, of which he was afterward pastor and pastor emeritus. During the Civil War, and after, he gained a wide reputation as a pulpit and platform orator. Among his books are: *Nature and Life* (1865); *Clear Grit*, lectures and poems edited by J. Haynes Holmes (1914).

**Colman, Benjamin** (1673-1747), American clergyman, was born in Boston. In 1699 he became pastor of the Brattle Street Congregational Church, Boston, a post he held until his death. Colman was a powerful preacher, and is remembered as a generous donor to Harvard and Yale, having refused the presidency of the former in 1724.

**Colman, George**, 'the Elder' (1732-94), English dramatic author and theatrical manager, was born in Florence. In 1760 his first dramatic piece, entitled *Polly Honeycomb*, was produced at Drury Lane with success. Other plays are *The Jealous Wife* and in conjunction with Garrick *The Clandestine Marriage*. He married Miss Ford, the actress, and was the author of meritorious translations of Terence (1765), the *Mercator* of Plautus, and Horace's *De Arte Poetica*.

**Colman, George**, 'the Younger' (1762-1836), English dramatist, son of the preceding. He succeeded his father as manager of the Haymarket Theatre (1785); and from 1824 till his death held the post of examiner of plays. Among the more popular of his plays were *The Iron Chest* (1796) and *Love Laughs at Locksmiths* (1803).

**Colman, Norman Jay** (1827-1911), American legislator, was born near Richfield Springs, N. Y. He was U. S. Commissioner of Agriculture from 1885 to 1889, and on the organization of the U. S. Department of Agriculture was its first Secretary (Feb. 11 to March 4, 1889). The establishment of agricultural experimental stations in the United States was largely due to him.

**Colman, Ronald** (1891- ), actor, born in Richmond, Surrey, England; educated at the Hadley School where he took part in amateur theatricals. He served in the World

War as one of 'the first 100,000' of the English army to land in France, played on London stages for a few years, and came to the United States in 1920. He has filled leading roles in many pictures, of which 'Beau Geste,' 'Arrow-smith,' and 'Cynara' are notable examples.

**Colman, Samuel** (1832-1920), American painter, was born in Portland, Me. He was elected to the National Academy in 1860, and was a founder and the first president of the American Society of Painters in Water Colors.

**Colmar.** See **Kolmar**.

**Cöln, or Köln.** See **Cologne**.

**Colobus**, a genus of African monkeys whose members are remarkable for their silky hair and tufted tails. In several species there is a 'mantle' of long hair at the sides of the body.

**Colocynth**, (Greek *kolokyntthis*), a well-known medicine, much used as a purgative, is the dried and powdered pulp of the *Colocynth Gourd*, *Cologintida*, *Bitter Apple*, or *Bitter Cucumber*, a globose fruit about the size of an orange, of a uniform yellow color, with a smooth, thin, solid rind. The plant which produces it, *Cucumis* (or *Citrullus*) *Colocynthis*, is nearly allied to the cucumber. It is found very widely distributed, growing in immense quantities on the sand hillocks of Egypt and Nubia, India, Portugal, Spain, etc.

**Cologne**, (changed officially to COLN in 1901), a city in the Rhine province, Prussia. Although Koblenz is the official capital of the province, Cologne, by virtue of its history, the magnitude of its commerce, its position as a fortress of the first class (one of the chief defenses of the empire on the western frontier) and its archiepiscopal see (Roman Catholic), is the most important town. In the heart of the city are many houses of the 15th and 16th centuries, and even earlier. The streets are narrow and crooked, but outside the central quarters there has been a remarkable transformation since the demolition of the old town walls in 1881-5. One of the most important features of the new city is the Ringstrasse, a fine boulevard, nowhere less than 60 feet in width, encircling the entire old town.

The principal object of interest, as well as the greatest ornament of the city, is the magnificent Cathedral, or Dom, one of the purest specimens of Gothic architecture in the world. Its foundations were laid in the middle of the 13th century, and the choir was dedicated in 1322. The work was carried on slowly until the period of the Reformation, when it was discontinued, and even the parts already completed were allowed to fall into disrepair. At the beginning of the 19th century, however,

the preservation of what was recognized as one of the chief architectural treasures of Europe was assured by a national subscription. The work of renovation was begun in 1823, and the edifice, completed according to the original plan, was opened in 1880, in the presence of Emperor William I. and all the reigning German princes. The Cathedral contains the shrine of the Three Kings of Cologne (supposed to be the Three Wise Men who came from the East to adore the Infant Christ). Their bones are said to have been brought to Cologne by Frederick Barbarossa. In the choir the heart of Marie de' Medici is buried.

The Church of the Minorites, containing the tomb of the celebrated scholastic Duns Scotus, St. Maurice's Church, and the Church of the Jesuits are also good examples of Gothic architecture. Other important churches are: St. Peter's (1524), containing Rubens' celebrated *Crucifixion of St. Peter*; the Apostles' Church (11th and 12th centuries); St. Gereon's, possessing the relics of the 308 martyrs of the Theban legion; and St. Ursula's, where are preserved the bones of the 11,000 martyred virgins, companions of St. Ursula. The (municipal) Wallraf-Richartz Museum (1855-61) is especially noteworthy for its collections of pictures and Roman and mediæval antiquities.

In the newer parts of the city stand the Industrial Art Museum (1899-1900); the former city gates, which now contain the natural history and historical collections; the Synagogue; and the fountain erected (1897) to commemorate Emperor William I. The Zoological and Botanical Gardens are on the north side of the city. The educational institutions include the Academy of Practical Medicine, the University of Cologne (the 3d largest in Germany), the United School of Engineering, the Arts and Crafts School, and commercial and technical secondary schools. The city has acquired a high reputation for music. It is the cultural center of western Germany and a travel center.

After the World War, Cologne retained its rank as the chief economic center of the Lower Rhineland. The only Produce Exchange in Prussia was organized here in 1919 and there is a Stock Exchange. Cologne is the chief western Germany livestock market and the center of the Rhine brown-coal industry and also of the aluminum, ultramarine, sugar and tobacco industries.

Manufacturing is an important industry; sugar, tobacco and cigars, and chocolate being prominent among the city's products. The celebrated perfume known as eau de Cologne

or cologne water is manufactured here. Printing is a leading industry, and the *Kölnische Zeitung* is a famous newspaper with an enormous circulation. Commerce is large. The city's well-equipped air port is the center and junction of air lines connecting with all parts of the world. It is the fifth largest city in Germany; p. 769,000.

The military Colonia (*Agrippinensis*), from which the city derives its name, was planted here by Agrippina, wife of the Roman Emperor Claudius, in the year 50 A.D. It became the capital of the Roman province of Lower Germany. From 1367 Cologne was one of the most influential members of the Hanseatic League. Aided by a native school of painters and architects, and by the founding of the University (1388), the city became (13th to 15th century) one of the largest and most powerful in Europe. But from the 16th century it slowly decayed, the process finally culminating in the suppression of the University, and the annexation of the city to the French republic (1797). The revival of Cologne dates from its incorporation with Prussia in 1815. A number of Allied air raids were carried out on the city during the World War. In December 1918, it was occupied by the Allies and became headquarters of the British army of occupation until 1926. Cologne was repeatedly bombed in World War II. Consult K. Hinkson, *Life in the Occupied Area* (1925); H. Wiegner, *Handbuch von Köln* (1925).

**Cologne, Eau de.** See **Eau de Cologne.**

**Colombes**, town, department Seine, France. In the castle, Henrietta Maria, queen of Charles I. of England, died in 1669; p. 57,313.

**Colombia**, republic of South America, occupying the n.w. corner of the continent. It is bounded on the n. by the Caribbean Sea; on the s. by Brazil, Peru, and Ecuador; on the e. by Venezuela and Brazil; on the w. by Ecuador, the Pacific Ocean, and Panama. The area is variously estimated at from 443,985 to over 450,000, a commonly accepted estimate being 447,536 sq. m. The most striking physical characteristic of Colombia is the group of three great mountain ranges which traverse the country from n. to s. These ranges, which are part of the Andes, are known as the Eastern, Central, and Western Cordilleras, and rise in places to heights of 15,000 and 16,000 ft. To the e. of these ranges stretch vast *llanos* or plains, while between them are longitudinal valleys drained by rivers flowing into the Caribbean Sea, of which the chief are the Magdalena and its great tributary the Cauca, the Sinu, and the Atrato. These rivers in their

lower courses divide into branches, and form islands and lagoons. On the e. side of the Cordilleras the rivers flow for long distances through swampy llanos, to the Orinoco on the e., or the Amazon on the s.e. Owing to the peculiar topography of the country, the climate of Colombia is extremely varied. In general there is a wet and a dry season. Although it touches the Equator, there are portions perpetually covered with snow; while the seacoast, valleys, and swampy plains present a typically tropical aspect. In the low lands, the mean temperature is from 74° to 86° F. In the temperate zone, the annual mean varies from 62° to 72°, and the climate is healthy; while in the cold zone, the mean is below 60°. The valleys are hot—even hotter than the coast—and the llanos of the Orinoco and Amazon basins are particularly sultry. The rainfall is heavy on the coast, amounting to 100 inches in the n.e., and perhaps 200 inches in the Atrato valley and on the Pacific coast. On the higher land it is much less—at Bogotá, 45 inches.

The oldest rocks are gneisses, schists, granite, and other eruptive rocks, which are overlaid with sandstones, slates, and limestones, with porphyries and porphyrites between. The three mountain ranges show great variation in character. The low mountains on the west coast are covered with Quaternary sandstones and marls, showing shells of extant species which are now found in the neighboring waters. The Western Cordillera itself seems to consist principally of sandstones and porphyritic rocks of the Cretaceous series. The Central Cordillera shows gneiss and other crystalline rocks, with sedimentary deposits of the Cretaceous age; while the Eastern range is composed almost entirely of Cretaceous rocks. In the Cauca valley, between the Western and Central Cordilleras, are red sandstones and coal seams which may belong to the Tertiary period. Coal beds, probably of the same period, are found elsewhere in the country. There are some volcanoes, but these are of comparatively little importance.

Owing to the wide range of temperature to be found within its borders, the fauna and flora of Colombia are exceptionally varied in character. The flora include almost all varieties of vegetable life common to the tropic, semi-tropic, and temperate zones. In the semi-tropic zone coffee of excellent quality is produced; the agaves yield fibers for the manufacture of ropes and bags, and juice for the preparation of *pulque*; and cinchona bark is obtained in the forests. European crops, such

as wheat, barley, oats, alfalfa, and potatoes and other vegetables, are produced in the temperate regions. Perhaps the most characteristic of all Colombian flora are the palm trees, to be found in great variety throughout the republic. From them the natives obtain such varied products as vegetable ivory, wax, coconuts, palm wine, a kind of butter, and the fiber used in the manufacture of Panama hats.

The fauna is not less varied than the plant life. Among the quadrupeds are to be found the puma, jaguar, two species of bear, tapir, capybara, peccary, and several families of deer. Almost every variety of bird life, from the great condor on the heights of the Cordilleras to the tiny humming bird in the tropical valleys, is found.

Colombia is exceedingly rich in minerals. Gold, for which it has been famous since the Spanish conquest, is found in all departments, the principal mines being in Antioquia State, mostly alluvial. Colombia surpassed the other South American countries in 1937 in gold exported. Colombia leads the world in the production of emeralds. The Muzo emerald mine is government-owned, the Chivor is American-owned; the yearly output is about \$250,000. Colombia ranks high in platinum production, averaging about 30,000 ounces annually. Salt is a government monopoly leased to the Banco de la República (annual revenue about 1,500,000 pesos). Copper deposits are present in great variety and coal of high quality, especially near Cali. Oil is exported under the domination of Americans, about 20,000,000 barrels being annually piped to the coast. Silver, iron, platinum, lead, mercury, cinnabar, manganese, limestone, sand and fire-clay are mined, and sulphite, nitre, garnets and asphalt of a very high grade have been found. There are valuable pearl fisheries which are a government monopoly.

Cultivation of the soil is the leading industry. Colombia ranks high as a producer of coffee, which is grown on the rugged hillsides at an elevation of 4,500 to 6,000 ft. Small farms here produce the choicest coffee. There is also extensive production of sugar and tobacco. Cattle raising is extensive on the millions of fertile acres of the southeastern plains. Colombia has a highly developed banana production which is largely controlled by the United Fruit Company.

The interior departments, which are the most productive, are separated from each other and from the coast by mountains or swampy plains, which accounts for the fact that there were only about 2,000 m. of rail-

road in 1941. The bulk of the transportation is by using mules. The Magdalena River in the e. flows into the Caribbean Sea, and is navigable for river steamers for 930 m., as far as Jiradot, carrying a comparatively heavy traffic. There is daily airplane service between Bogota and Barranquilla and New York. Colombia has wireless telephony and international cable service. There were about 3,400 m. of nat'l. highways in 1940. The longest overhead ropeway in the world connected Mariquita and Manizales.

According to the census of 1939 the population of Colombia was 8,702,000, mainly whites and half-castes. Indians less than 10%. Immigration is almost negligible. The principal towns are Bogota, the capital, 330,312; Barranquilla, 152,350; Cali, 102,000; Medellin, 168,000; Cartagena, 85,000.

Primary education is free, but not compulsory. National institutions for higher education include Bogota University (founded in 1572) and the School of Mines at Medellin.

Colombia is divided into 14 departments, 3 intendencies, and 7 commissaries. The government is that of a centralized republic, and is carried on by a president, elected by direct vote, and a legislature of two houses—the House of Representatives elected by the people, one for every 50,000 people; the Senate elected indirectly by departmental assemblies (at least 3 for each department). The departments have their governors appointed. The constitution was promulgated in 1886, and somewhat modified, to increase the power of the president in 1905.

Colombia was one of the first parts of the American continent to be discovered by the Spanish navigators. Three years before Columbus touched there (1502), Alonso de Ojeda had visited several points along the coast. The beginning of the 19th century was marked by a revolt against Spanish authority, extending practically throughout South America. In 1811 an insurrection broke out in Colombia, known at that time as the Presidency of New Granada, and including what has since become Venezuela and Ecuador. A bitter and prolonged struggle followed, the insurgents being under the leadership of Simon Bolivar, the great national hero. Independence from Spanish rule was won, but in 1829 Venezuela seceded from the newly formed republic, followed in 1830 by Ecuador. The Republic of New Granada, consisting of eighteen semi-independent states, was formed (1831-2), a constitution promulgated, and the first president, Francis de Paul Santander, elected.

In 1891 a boundary dispute between Colombia and Venezuela was settled by arbitration, but in 1901 war broke out between the two countries. This conflict was followed by continuous civil war lasting until 1903. In that year a treaty between the United States and Colombia was drawn up at Washington by John Hay and Tomas Herran, concerning the cession to the United States of a portion of Panama for the construction of a canal. This treaty was signed by the plenipotentiaries of both countries and ratified by the United States Senate. The Colombian congress, however, refused to ratify it. At this juncture a revolution broke out (Nov. 3, 1903) in Panama, a district which had frequently been in armed conflict with the central government, and a republic was declared. On Nov. 7 the United States recognized the independence of the new republic, and the other powers soon followed the example. Colombia, however, refused to recognize Panama's independence, and regarded the circumstances attending its recognition by the United States as a breach of international law.

In 1904 General Rafael Reyes was elected president, and through various constitutional amendments became virtually dictator. In 1910 he was succeeded by Dr. Carlos E. Restrepo, whose term expired in August, 1914. He was followed by Jose Vicente Concha (1914-18), and he by Don Marco Fidel Suarez (1918-22).

In 1921 Colombia's grievance against the United States, arising out of the latter's recognition of Panama in 1903, was settled by the ratification of the Colombian Treaty by the U. S. Senate. The treaty provides for the payment to Colombia, by the U. S. Government, of \$25,000,000, and for the granting to Colombia of special privileges in respect to the Panama Canal. Colombia recognized the independence of Panama, and was granted the same privileges for citizens and products entering the Canal Zone or passing through the Canal as those enjoyed by the United States.

Since the beginning of the 20th century Colombia has made great advances in her economic development. There were no political disturbances or revolutions and she had the smallest military budget in South America.

In 1933 Colombia owed to American investors about \$174,000,000. About one-third of American capital in Colombia is in oil. Gold export was barred in September 1931. In 1931, Buenaventura, the principal port of Colombia on the Pacific, was destroyed by fire. In 1932 a new judicial code was enacted,



and in November, married women were granted full control of their property and a share of property jointly acquired since marriage.

In 1938 Colombia and the United States raised their legations at Bogota and Washington to embassies. Following a Pan-American conference, 1942, Colombia severed diplomatic relations with Ger., It., and Jap.

**Colombo**, capital and chief seaport of Ceylon, on the w. side of the island at the mouth of the Kelani River. The chief exports are tea, the products of the cocoanut palm, plumbago, rubber and cacao. In the crowded 'Petah,' or 'black town,' dwell Veddahs, Burmese, Afghans, Sinhalese, Tamils, Eurasians and Malays. There is a Dutch church and a Buddhist temple. Among educational institutions are: The University and Royal College (of the government); St. Joseph's College (Roman Catholic); St. Thomas' College (Anglican), and Ananda College (Buddhist).

Colombo was discovered in 1505 by the Portuguese, who built stores, factories and fortifications. The Dutch took possession in 1656, greatly extending the fortifications, and were in turn superseded by the English in 1796; p. 308,000.

**Colon**, that portion of the large intestine which extends from the cæcum to the rectum, the terminal portion of the intestinal canal. See ALIMENTARY CANAL; DIGESTION; INTESTINES.

**Colon**, or **Aspinwall**, town, republic of Panama, founded in 1850, on the w. side of Manzanilla Island, on Limon Bay, an inlet of the Caribbean Sea. Much of the commerce between Atlantic and Pacific ports passes through the city.

Cristobal, Panama Canal Zone, is an American town which adjoins Colon and is practically a part of it. Since 1903 the United States has had jurisdiction over sanitation and quarantine, while the draining of swamps, a new sewage system, and the screening of houses against mosquitoes, the work of Gen. Gorgas, have made the town one of the most healthful tropical cities in the world. Colon is the Atlantic terminus of the Panama Railroad (46 m. long), and of the Panama Canal. It is a busy tourist city. Natives from very many countries here sell their wares. It is connected by cable with North American and South American ports and also with European ports; p. 33,460.

**Colon Bacillus**. See **Bacteria**.

**Colonel**, the military rank next below that

of general officer, and next above that of lieutenant-colonel. See **OFFICER**.

**Colonia**, department of Uruguay, on the Plata, below the Uruguay River; in the fertile valleys are numerous colonies, engaged in agriculture and stock raising; p. 113,456.

**Colonial Wars, Society of**, a patriotic society organized in 1892 to perpetuate the memory of those who in military, naval, or civil service assisted in the establishment and continuance of the American colonies, and to preserve records and documents of the period.

**Colonies, Labor**. See **Labor Colonies**.

**Colonization Society**, the **NATIONAL**, a society in the United States organized in 1816 for the purpose of promoting the colonization of free negroes somewhere, preferably in Africa, outside of the United States. Among its members were originally many men who were subsequently Abolitionist leaders, and who abandoned the society on becoming convinced that instead of encouraging emancipation it really was designed merely to relieve the South of the free negroes already there, and tended to foster rather than to discourage slavery. A number of free negroes were at first sent to the British colony of Sierra Leone; Sherbrooke Island was then tried and abandoned; and in 1821 the settlement was established which eventually (1847) developed into the republic of Liberia. For the attitude of Abolitionists with regard to the society, see William Jay, *Miscellaneous Writings on Slavery* (1853); Birney, *Letter on Colonization* (1834).

**Colonna**. 1. **Prospero**, 1452-1523, Italian military adventurer, who offered his services to Charles VIII. of France when he invaded Italy in 1494-5; later helped the Spaniards to expel the French from Italy; who was a very able general, entered afterwards the service of the Pope, and among other victories gained the battle of Vicenza (1513) against the Venetians. 2. **Pompeo** (1479-1532), Italian cardinal also a talented poet, and in his principal work, *De Laudibus Mulierum*, celebrates the famous Italian poetess, Vittoria Colonna.

**Colonna, Giovanni Paolo** (1640-95), Italian composer, chiefly of church music, born at Bologna.

**Colonna, Vittoria** (1492-1547), Italian poet, born on the family estate of Marino; was one of the leading spirits among the reform party of the Roman Catholic Church; best known work is her *Rime*, 1538. See biography by Mrs. H. Roscoe (1868). Her *Letters* have been edited by Tordi (1892).

**Colonna, Cape**, the most s. point of Attica,

Greece. On its summit, 269 ft. above the sea, stand the ruins of a temple dedicated to Athene.

**Colonna Palace.** See **Rome**.

**Colonne, Edouard** (1838-1910), French violinist and musical director, born at Bordeaux; is chiefly noted for having popularized the music of Berlioz, and for producing the works of young French composers.

**Colonsay** and **Oronsay**, two Inner Hebridean islands, Argyllshire, Scotland. St. Columba founded a college on Colonsay and landed at Oronsay, 563, where there is a fine sculptured cross. Total area of both islands, 11,070 ac.; p. 273.

**Colonus**, ancient township in Attica, Greece, distant a little more than a m. from Athens; was famous for a temple of Poseidon, a grove of the Eumenides, and as being the birthplace of Sophocles, who celebrates it in his drama the *Œdipus Coloneus*.

**Colony**, in its literal sense, a body of immigrants living in a foreign land under laws and protection of the mother country; but it has been used loosely to describe all types of distant territories in any way dependent upon a ruling power, from mere military posts such as Gibraltar to virtually autonomous states such as Canada or Australia. Consult Lewis' *Government of Dependencies*; Rohrbach's *Die Kolonie* (1907); Roosevelt's *African and European Addresses* (1910); Peters' *Zur Weltpolitik* (1912).

**Colophon**, one of the twelve ancient Ionian cities in Asia Minor; the birthplace of the poet Mimnermus. There are ruins of numerous Greek tombs and temples.

**Colophon**, a postscript or inscription at the end of a book, adopted by early printers from the manuscript copyists, and continued until the introduction of title pages (about 1490). It generally contained the date and place of publication, and the name of the printer; sometimes, also, other particulars concerning the publication and character of the book. The first colophon printed was in a Psalter issued at Mainz in 1457. The word came into use about the middle of the 18th century. Consult Pollard's *Essay on Colophons* (1905).

**Colophon, The**, Book Collectors' Quarterly, a magazine devoted to rare books and printing, was founded in 1930.

**Colophony**, or **Rosin**, is the residue left when the exudation from coniferous trees has been distilled to obtain oil or spirits of turpentine. Colophony consists chiefly of abietic anhydride, and is a very brittle, semi-transparent solid. Colophony burns in air and when

heated melts, afterward decomposing, and yielding a complicated mixture, known as rosin oil, as the principal product. Rosin is used as a protective in soldering, and in the commoner varnishes, and as an ingredient of the cheaper soaps.

**Color**, the quality of an object, determined by its molecular constitution, which causes it to produce a specific effect on the eye by the absorption, reflection, and transmission of rays of light of a certain wave length; or the sensation produced through stimulation of the optic nerve by such rays.

Colors are generally classified as primary and secondary, but there are three important interpretations of the former term: (1) the chief spectral colors (red, orange, yellow, green, blue, and violet); (2) spectral red, green, and violet (or blue), which cannot be produced by the union of any other spectral colors; (3) the pigments red, yellow, and blue. Colors are also described by their qualities of hue, due to the length of the ether waves that make the retinal impression; luminosity (shade, value, or brightness); and purity, or freedom from commingling waves of different wave lengths.

Newton, following Francis Bacon, proved, by his famous experiments with prisms, that sunlight is composed of rays of a great number of different colors (see DISPERSION; SPECTRUM); and the simple reason why bodies exhibit so many different colors is that each absorbs in its own peculiar way certain of these component colors to a greater extent than it does others. A body of such molecular composition that it absorbs all rays equally will appear to be of the color of the light in which it is viewed; and, being viewed generally in sunlight (white), is associated with white.

Complementary colors are any two which together make white. Such, for example, are red and blue-green, orange and greenish blue, yellow and blue, yellow-green and violet, pure green and rose. Indeed, to every tint in the spectrum of white light a complementary tint may be found. This consideration shows that white light is not always of the same composition. The only way to test the composition of any light is to form its spectrum, and separate the components so that they may be seen individually.

The apparent color of an object is also affected by the presence of other colors, and by the state of the eye of the observer. A red strip on a green ground will appear more distinctly red than the same strip on a red ground. The change in such cases of simultaneous contrast varies with the relative position in the

spectrum of the two colors, being greatest when they are adjacent.

Again, when the eye has looked for some time steadily at a particular color, it will become fatigued as regards that color more than as regards any other. Consequently, if it is then directed upon a white object, it will see the form of the former object occupying part of the field, but with the complementary tint. A great many curious experiments may be made along these lines, giving rise to the phenomena of contrast colors and after-images, some of which have not yet been fully explained. These effects depend, indeed, upon the physiology of sight. See VISION.

Thus far we have explained the production of color in bodies as the result of a selective absorption on the part of the body; and this, doubtless, is what occurs in the vast majority of cases. But there are certain cases of color production which require a totally different line of explanation. Such, for example, are rainbows, halos, coronæ, colors of soap films, of insects' wings, of oil scum, and the beautiful color phenomena produced with polarized light. The rainbow is a refraction caustic; lunar coronæ are diffraction phenomena; and the color of soap films will be found discussed under the heading INTERFERENCE. See COLOR BLINDNESS; POLARIZATION OF LIGHT.

Consult Rood's *Modern Chromatics and Color* (1904); Abney's *Color Vision; Color-Sense Training* (1908); Sanford's *Manual of Color* (1910); E. R. Watson, *Colours in Relation to Chemical Constitution* (1918).

**Colorado** (popularly called the 'Centennial State'), a Western State of the United States, bounded on the n. by Nebraska and Wyoming, on the e. by Nebraska and Kansas, on the s. by New Mexico and Oklahoma, and on the w. by Utah; covers an area of 103,948 sq. m., of which 303 sq. m. are water.

Topographically, Colorado is divided into three natural sections—the mountains, the foothills, and the plains. The last division occupies the eastern third of the State, and has an average elevation of nearly 6,000 ft. The foot-hills form a narrow belt between the plains and the great Rocky Mountain Front Range, which extends from n. to s., near the center of the State.

The Colorado mountain ranges are noted for the great number of high peaks; Mount Elbert (14,436) is the highest. Pike's Peak, near Colorado Springs, in the Front Range, is the best known. The so-called parks are on a grand scale. They are the systems of plateaus and high enclosed valleys or rolling country

lying between the great mountain ranges of the western half of the State, and are known as North, South, Middle, Estes, and San Luis Parks. They occupy from 2,000 to 8,000 sq. m. each, and the first three lie at an elevation of 9,000 ft.

The drainage of Colorado is westward into the Colorado River system for the western third of the State, and eastward into the Mississippi system for the eastern two-thirds. The principal rivers, in the order of their size, are the Grand, Arkansas, South Platte, and Gunnison. The first two have cut impressive gorges through the mountain barriers, so that the canyon of the Grand and the Royal Gorge of the Arkansas are, next to the Grand Canyon of the Colorado, the most stupendous of the Rocky Mountain region. Mineral springs abound, and many have important medicinal qualities.

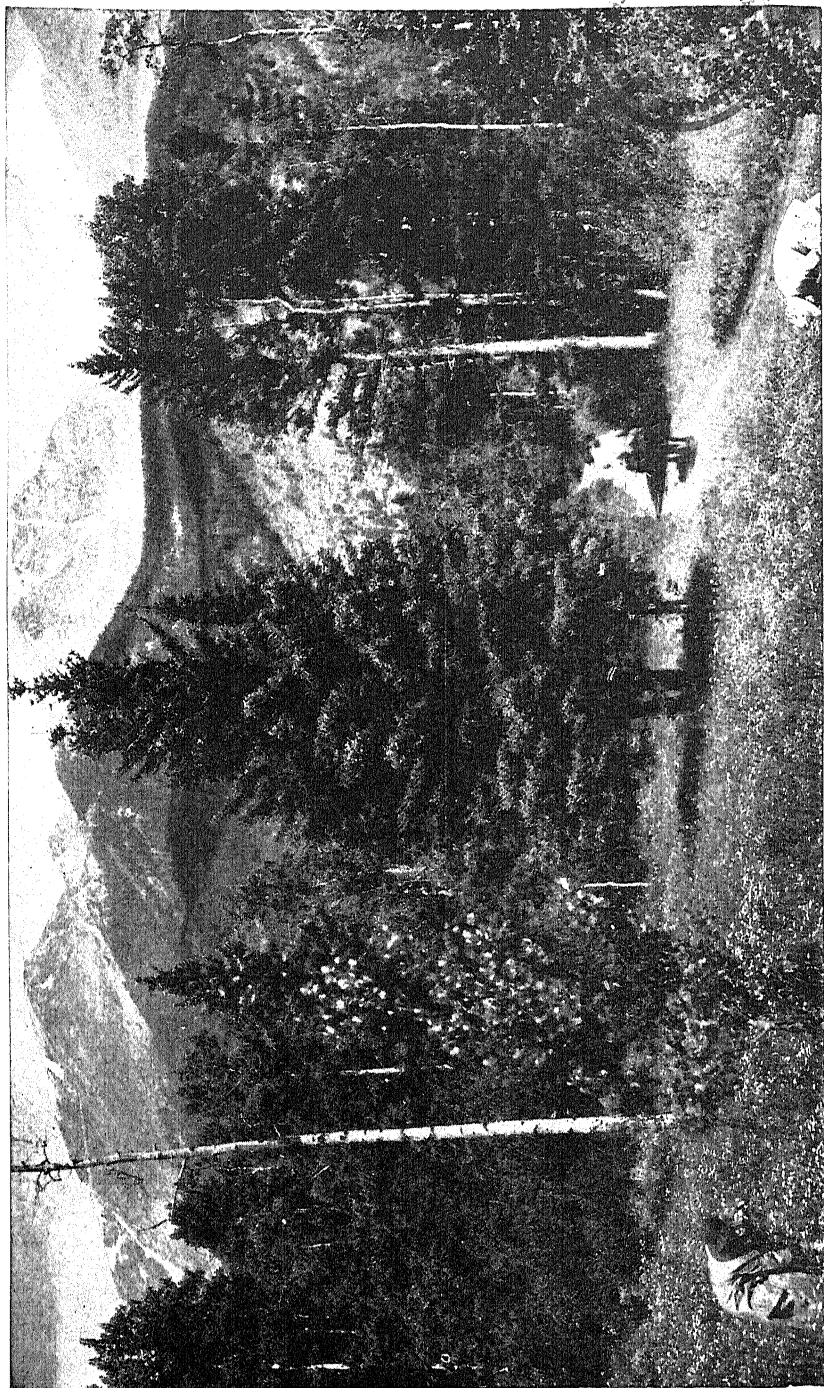
There is no rainy season. The atmosphere is dry, clear, invigorating. Snows are light on the plains and disappear quickly; but are heavy in the mountains. Colorado is esteemed as a natural sanitarium for victims of tuberculosis.

The geology of Colorado is complex, and representatives of almost every age in the geologic scale, from the Archæan to the present, are found. The older formations occupy the axes of the great mountain folds, and consist of granites, gneisses, schists, quartzites, and related rocks. The plains area and much of the western margin show great development of Cretaceous and Tertiary strata. Folding, faulting, fissuring, and mineralization are characteristic of the mountain ranges. The Precambrian schists of the Gunnison gold belt are hornblendic, and seamed with diabase dykes.

Colorado abounds in mineral wealth. In 1930 the richest helium discovery ever made (7%) resulted from a natural gas well near Thatcher, southeastern Colorado. The principal minerals are coal, gold, clay products, and silver. Other mineral products include: lead, iron ore, copper, mica, molybdenum, vanadium, feldspar, fuller's earth, gypsum, graphite, pyrite, limestone, sandstone, granite and semi-precious stones.

The forests of Colorado are mainly coniferous, the principal commercial timber trees being yellow pine, lodgepole pine, Douglas fir, Engelmann spruce and blue spruce.

About 43 per cent of the State is farm land. The soils are mainly alluvial and the river valleys are the chief seats of farming enterprise. Because of this distribution and the arid climatic conditions that prevail over two-thirds of the State irrigation is largely practised.



*Photo by Frank M. Hallenbeck for the Burlington Route, Chicago, Ill.  
Estes Park, Colorado.*

Under this treatment the lands are very productive. The State ranks first in the production of sugar beets and beet sugar; other products are: hay, corn, wheat, potatoes, beans, oats, rye, cantaloupes, apples, peaches and pears.

Stock raising is an important industry particularly in the southern counties favored with natural grasses rich in feeding qualities.

Manufacturing interests are increasing in value. The leading industries are: slaughtering and meat packing; railroad shop construction and repairs; flour and other grain-mill products; etc. According to the Federal Census of 1940 the population of Colorado was 1,123,296.

Institutions for higher learning include the University of Colorado at Boulder; the Colorado State Agricultural College at Fort Collins; the University of Denver; Teachers College at Greeley and State Normal at Alamosa; and a School of Mines at Golden.

The State institutions are under the control of a State board. They include the Home for Dependent and Neglected Children at Denver; the Industrial School for Boys at Golden; the Industrial School for Girls at Morrison; the School for the Deaf and Blind at Colorado Springs; the Insane Asylum at Pueblo; the Soldiers' and Sailors' Home at Monte Vista; the penitentiary at Canon City; reformatory at Buena Vista; the Industrial Workshop for the Blind at Denver; and two Home and Training Schools for Mental Defectives at Ridge.

Colorado takes its name from the Spanish word meaning 'ruddy,' relating to the prevailing red rock of the country. The name was first applied to the Colorado River. The first historical exploration of the Colorado region was made by the Spanish Padre Francisco Escalante, who visited the Gunnison country in 1776. It is claimed that other Spaniards had preceded him, but no earlier settlement was made. The first American to arrive seems to have been James Pursley, a fur trader, who penetrated the mountain country in 1804.

That section of the present State which lies n. and e. of the Arkansas River was a part of the great territory of Louisiana purchased by the United States in 1803. The remainder of the State continued under Spanish dominion until the Mexican revolution (1821), when it became a part of Mexico. When Texas won its independence, in 1836, the eastern part of this Mexican territory became a part of Texas, and in 1845 a part of the United States. At the close of the Mexican War the western por-

tion of Colorado was ceded by Mexico to the United States (1848).

The early settlers were harassed by the Indians, and in 1850 the population was small and widely scattered. In 1858 gold prospecting was started; the success attending it led to considerable immigration; and two towns, Denver and Auraria, were platted.

In 1859 the 'Pike's Peak or bust' migration left a population of 30,000 in the country, and a delegation was sent to Washington to secure the formation of a new Territory under the name Jefferson. Finally, in February, 1861, Congress organized the Territory from portions of Utah, New Mexico, Kansas, and Nebraska, under the name of Colorado; and in 1876 Colorado was admitted to statehood.

Indian uprisings on the part of the Cheyennes and Arapahoes occurred during the period 1864-70, which, together with the increasing scarcity of gold, retarded the growth of the Territory. In 1878, however, the mining industry received a new impetus by the discovery that the carbonates, which had been discarded by the gold miners, contained lead and silver in sufficient quantities to be of commercial value. The mining interests were furthered by the discovery of gold in Cripple Creek district about 1890 which brought many new settlers.

In 1939, plans and surveys were in progress on the Big Thompson project, estimated cost \$44,000,000, (Federal), to impound water on the western slope of the Continental Divide and flow it under the mountains by a 13 mile tunnel to irrigate lands in northeastern Colorado.

**Colorado**, town, Texas, county seat of Mitchell co.; an important shipping point for cattle, sheep, grain, and fruit. There are also large salt wells in the vicinity; flour milling is important; p. 5,213.

**Colorado City**, formerly a separate town, El Paso county, Colorado, now a part of Colorado Springs. It was the first capital of Colorado Territory.

**Colorado College**, the oldest institution of higher learning in Colorado, at Colorado Springs, founded in 1874. It is a co-educational and non-sectarian institution and offers courses leading to the degrees B.A., B.S., and A.M. It has a school of forestry, a school of business administration, and departments of music and art.

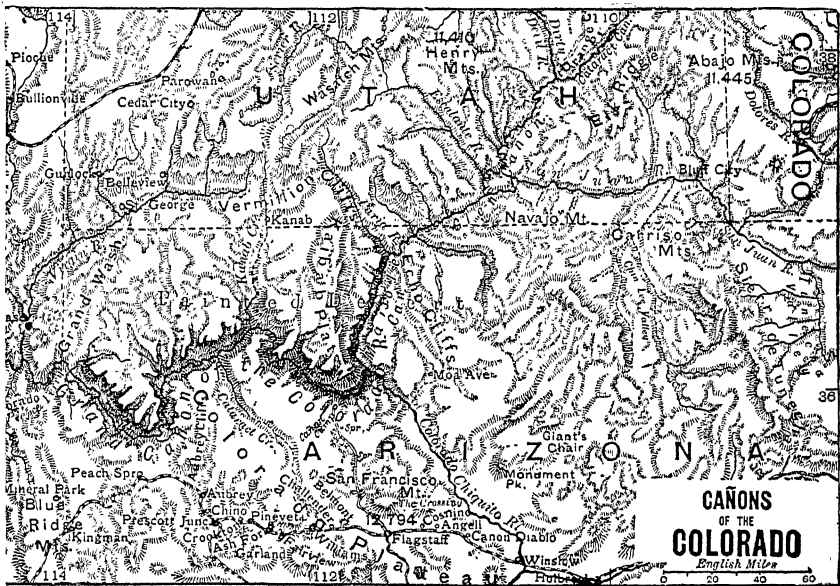
**Colorado Desert**, a region in Southeastern California, extending from San Jacinto Peak to the Gulf of California, and reaching to the

Peninsula Mountains on the west. The rainfall ranges from 3 inches in the s. to a maximum of 25 inches in the n.w. The climate is intensely hot in summer, averaging 90° F., and sometimes reaching 125° in the shade. The desert varies from a few feet above to 278 ft. below sea level. At the northern end of the desert is the Indio region, or Coachella Valley, and, in the south, the Imperial Valley, reclaimed by means of irrigation from the Colorado River.

Between the Imperial and the Coachella Valleys is the lowest part of the old lake bottom, the Salton Sink, which until recently was a marsh containing extensive salt deposits

the Green River. From this point the Colorado flows southwest into Arizona, then generally westward in a winding course to the northwestern corner of that State, turns south, and forms the boundary line between Arizona on the east and Nevada and California on the west. A few miles below Yuma it enters Mexican territory, through which it flows to its mouth at the head of the Gulf of California. The Colorado River is 1,700 m. long, with a total drainage basin of 244,000 sq. m. Only 80 m. of its length is in Mexico.

The principal branches of the Colorado River are the Green, Gunnison, Dolores, San Juan, Little Colorado, Virgin, Gila and Wil-



and mud volcanoes. In the flood seasons of 1905 to 1907, however, the Colorado found its way by means of the Imperial irrigation canal to its ancient course, did considerable damage to the Imperial Valley, and transformed the Salton Sink into the Salton Sea, with an area of 443 sq. m.

**Colorado Plateau, Great**, an elevated tableland in the northern part of Arizona, having an altitude between 6,500 and 8,000 ft.; it breaks off to the s. in an immense line of cliffs hundreds of miles in length, known as the Mogollon Escarpment.

**Colorado River**, a river in the southwestern United States, rising in Rocky Mountain Park, Colorado, flows southwest to its junction with

liams. For more than a thousand miles the river has cut a deep narrow gorge, and where streams join it this is broken into canyons. The famous Grand Canyon, the longest of these, extends from the mouth of the Paria to the Grand Wash, some 280 m., and affords a scene of extraordinary beauty and grandeur. (See GRAND CANYON). Boulder Canyon and Black Canyon, merging into each other, are about 40 m. from Las Vegas, Nevada.

Below Yuma, the river has often overflowed its banks on the west, inundating large areas lying below sea level. Where it crosses the international boundary into Mexico, it flows along the top of the rim of a great bowl, which extends up into California for a distance of

more than 100 m. The river is kept out of this bowl by levees which turn it south into the Pacific Ocean, but water is carried from it by canal, which runs through Mexico into the Imperial Valley. In order to prevent the occurrence of floods and their attendant destruction, the United States Government constructed the huge impounding dam at Black Canyon in Arizona and Nevada, creating the greatest artificial reservoir in the world, transforming stretches of arid desert in Arizona and Nevada into a garden, rendering the Colorado navigable even at low water as far as Grand Wash, and most of the time 40 m. up toward Toroweap, and creating more electric energy than Niagara and Muscle Shoals combined. Included in the project is the all-American canal, to carry water from Laguna Dam to Imperial and Coachella Valleys, thus ending the menace of international controversy with Mexico and furnishing water for the irrigation of 1,000,000 acres. See BOULDER DAM.

As early as 1540 the Colorado was visited by de Alarcon, a member of the Coronado expedition; and in 1542 Don Lopez de Cardenas discovered the Grand Canyon. This remained unexplored, however, for over 300 years, until 1869, when Major Powell and his party explored it. Since that time several others have accomplished the hazardous feat.

**Colorado River**, one of the largest rivers of Texas, rising in the Llano Estacado, in the western part of the State, and flowing in a general southeasterly direction to the Gulf of Mexico. Of the total length (715 m.) the lower part only (350 m.), traversing the flat country between Austin and the Gulf, is navigable, and is utilized for purposes of power and irrigation.

**Colorado Springs**, city, Colorado, county seat of El Paso co. Situated near the eastern base of Pike's Peak, at an altitude of 6,038 ft., it commands superb scenery, and is the principal health resort of Colorado. It is the seat of Colorado College, of the State Asylum for the deaf, dumb, and blind, the National Sanatorium of the Modern Woodsmen of America, and the Union Printers' Home. Near the city are Cheyenne Canyons, the Cave of the Winds, Grand Caverns, Seven Falls, Monument Park, and the famous 'Garden of the Gods'. Industries include smelters and reduction mills. City manager form of government was adopted in 1919; p. 36,789.

**Colorado State Agricultural College**, a coeducational State institution at Fort Collins, Colo., established in 1876 as a land-grant college. It offers courses in agriculture, engineering, arts and sciences, home economics, forestry

and veterinary medicine. There is a graduate school and an extension department. See COLLEGES.

**Colorado, University of**, a coeducational State Institution at Boulder, Colo., incorporated in 1861, and opened in 1877. The University consists of the College of Arts and Sciences including the departments of Home Economics, Education, Fine Arts and Journalism; a Graduate School, Medical School, School of Pharmacy, Law School, School of Business, Colleges of Engineering, an Extension Division and Summer Quarter.

**Coloration, Protective.** See **Colors of Animals.**

**Color Blindness**, the inability to distinguish certain colors or shades of color. *Total color blindness*, in which there is no perception of colors as such, but only of gradations of light and shade is rare. The most common form is that in which some bright colors, different in different cases, are confused with each other, though other colors are correctly perceived. This is known as complete partial color blindness to distinguish it from a third form (incomplete partial color blindness), in which bright colors are recognized, but more delicate shades are confused.

Color blindness may be congenital or acquired.

Congenital color blindness is attributed by Dr. Edridge-Green to one or more of the following conditions: absorption of certain rays by the eye; nonexcitability of the visual substance or optic nerve fibers by light rays of a certain wave length (shortening of the spectrum); imperfection of the color-perceiving apparatus.

Acquired color blindness may be caused by a diseased brain or by a diseased or wounded optic nerve; but it appears to be unconnected with defects of sight and with retinal diseases generally. The average eye distinguishes six spectral colors; an acute sense of color distinguishes seven.

Color blindness affecting one eye or both, has no known remedy. It must, however, be distinguished from mere ignorance of color names. Investigations during the 19th century established the importance of color blindness, especially in the mercantile marine and railway service; and various tests were devised for applicants for such positions. Tests for three colors are now required by law in some countries, and are in many other cases voluntarily applied by employers; but the official tests are considered by many to be inadequate. Holmgren's test, often supplemented by ex-

amination with specially adapted lanterns, consists of the matching of wools selected from over one hundred shades. Consult J. H. Parsons' *An Introduction to the Study of Color Vision* (1924).

**Colorimeter**, an instrument for estimating the strength or quality of a substance by comparing its color with that of a standard. There are several forms—the color being varied by altering the depth of a colored solution, the number of tinted glasses, or the width of opening on color screens, until a match is obtained. Mill's colorimeter is an example of the first class. Lovibond's of the second, and Ives' of the third.

**Coloring Matters.** See **Pigments; Dyeing.**

**Color of Animals.** As a rule, animals are remarkable for their beauty and variety of tint, as contrasted with the relative uniformity of plants apart from their flowers. Not infrequently the color of the animal harmonizes with that of its surroundings. On the other hand many animals stand out from their surroundings by their vivid contrasting colors. Again, while in not a few animals the females may be soberly colored, the males flash out in all the colors of the rainbow.

It is believed that when an animal resembles its surroundings, the resemblance either protects the animal against possible foes, or enables it to steal unperceived upon its prey. On the first assumption the term 'protective coloration' is applied to such forms of resemblance. Again, where the vivid colors of the animal make it exceptionally conspicuous, it has been suggested that, as such bright-colored animals are usually inedible or hurtful, the colors enable their potential enemies to learn quickly to avoid them—to associate brilliant colors with what to avoid. To such tints the name of 'warning colors' is therefore given by many naturalists. Finally, the bright colors of many males, as contrasted with the more sober colors of the females, were ascribed by Darwin to sexual selection—to the persistent choice by the females of the more decorative males. Under **MIMICRY**, as well as **EVOLUTION**, and so on, further details will be found.

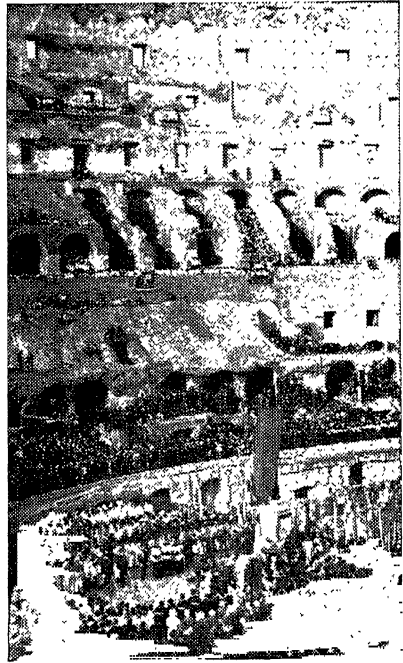
In regard to the physical causation of the colors of animals much still remains to be discovered. In many cases, especially in the simpler forms of animal life, the colors of the parts are due to the presence of pigments or dyestuffs, which impart their own color to the skin or organs. In other cases, especially in such animals as butterflies, many beetles, and some birds, the gorgeous display of color is

often due, not to specific pigments, but to the structure of the parts. See Bateson's *Materials for the Study of Variation* (1894); F. E. Beddard's *Animal Coloration* (1892); E. B. Poulton's *The Colors of Animals*, International Scientific Series (1890).

**Color Photography.** See **Photography.**

**Color Printing.** See **Printing.**

**Color Sergeant.** Each infantry and cavalry regiment in the U. S. Army has two color sergeants, the senior of whom carries the national color, the junior the regimental color.



*Colosseum at Rome.*

**Colors, Military**, the flags or standards carried by military organizations. In the United States army colors are classified as *flags, colors, standards, and guidons*.

The United States national flag is used in various sizes at all posts and all government buildings, and is carried by all infantry and cavalry regiments, battalions or squadrons, or other troops marching in these formations. The President's flag is blue; that of the Secretary of War, scarlet; that of the Assistant Secretary of War, white. The flag of the Geneva Convention, a red cross on a white ground, together with the national flag, is used over hospitals in time of war.



The colors of the President are of scarlet silk, as are also those of the secretary of war. Each regiment of infantry and cavalry, each battalion of engineers, and the artillery corps have, in addition to the national flag, a distinctive regimental or battalion color.

Cavalry regiments have each a standard, which is simply the national flag of silk with the official designation of the regiment engraved on a silver band on the lance by which the standard is carried.

Each troop of cavalry, battery of field artillery, and mounted section of engineers carries a guidon, appropriately marked with the designation of the organization. See ARMY OF THE U. S.

**Colossæ**, town in ancient Phrygia, in the s.w. of Asia Minor, not far from Laodicea; its ruins lie near Khonas. It is chiefly remembered for the epistle addressed to its church by St. Paul. See Sir C. Wilson's *Asia Minor* (1895).

**Colosseum**, The (sometimes less correctly spelt COLISEUM), is the largest Roman amphitheater known. It stands in Rome, on the site of Nero's palace. It was begun by Vespasian in 72 A.D., and finished by Domitian in 82 A.D.; but a fourth story was added by Severus Alexander (d. 235 A.D.) and Gordianus (d. 238 A.D.). It was capable of seating 50,000 spectators, and afforded room for 20,000 to stand. Externally the building has four stories, the three lower with arcades; the first is of Etruscan architecture, the second Ionic, the third and fourth are Corinthian. Its height is 157 ft. Underneath the arena were dens for wild animals, and appliances for raising them into the arena. The Colosseum was chiefly destroyed in the 15th century, when it was used simply as a quarry for marble and other building material, until Pope Benedict xiv. (1740-58) intervened and saved it from complete destruction. See J. H. Middleton's *Remains of Ancient Rome* (1892); and W. J. Anderson and R. P. Spiers' *Architecture of Greece and Rome* (1902).

**Colossians**, **The Epistle to the**, was probably written by Paul during his imprisonment in Rome (c. 63 A.D.). The authenticity of Colossians has frequently been denied, but the tendency now is to return to the traditional view regarding its authorship. For the connection between Colossians and Ephesians, see EPHESIANS. There are commentaries and introductions by Lightfoot (1886), T. K. Abbot (Int. Crit. Com. 1897), H. C. G. Moule (1900), Maclaren (Expositor's Bible, 1893).

**Colossus**, a word used by the ancient

Greeks, and after them the Romans, to designate statues of more than life size, but particularly those of gigantic proportions. The name is applied in a special sense to the famous Colossus of Rhodes, representing the god Apollo, the work of Chares of Lindus, which was about 100 ft. in height. The statue stood at the entrance of the harbor, but not with one leg on either side, as is often said. An earthquake cast it to the ground in 224 B.C.

**Colotomy**, the operation of opening into the colon, or lower portion of the intestine, usually for stricture.

**Colpachi Bark**. The botanical source of this bark is probably *Croton Pseudochina* (Euphorbiaceæ), which inhabits South America.

**Colquhoun**, **Archibald Ross** (1848-1914), British traveller, born off the Cape of Good Hope. He travelled widely in China, Mongolia and Siberia. He was administrator of Mashonaland (1890-1), and examined the Nicaragua and Panama Canal routes in 1895. He published, among other works, *Across Chryse* (2 vols. 1883), *English Policy in the Far East* (1885), *Renascence of South Africa* (1900), *Key of the Pacific* (1895), *Russia against India* (1900).

**Colquhoun**, **John** (1805-85), Scottish writer on sport, born in Edinburgh. A keen sportsman, he published *The Moor and the Loch* (1840; 7th ed. 1893), *Salmon Casts and Stray Shots* (1858), and *Sporting Days* (1866). He died at Edinburgh. See Sir W. Fraser's *Chiefs of Colquhoun* (1869).

**Colquhoun**, **Patrick** (1745-1820), provost of Glasgow, born at Dumbarton. He came to the United States in 1761, and lived for several years as a successful merchant in Virginia. Returning to Glasgow, he became the founder of the Glasgow Chamber of Commerce. He wrote many pamphlets.

**Colquitt**, **Alfred Holt** (1824-94), American soldier and senator, was born in Walton co., Ga. In the Confederate army he rose from captain to major-general, and took part in all the campaigns in Virginia. He was governor of Georgia, 1877-83, and U. S. senator from that state from 1883 until his death.

**Colt**, **Samuel** (1814-62), American inventor, was born in Hartford, Conn. He perfected an early model of the revolver associated with his name, made out of wood, while he was a boy at sea. He took out his first patent in 1835, and the same year formed a company at Paterson, N. J., for the manufacture of his revolvers. They were regularly adopted for

use in the U. S. army, and in 1852 Col. Colt acquired 250 acres of land near Hartford, Conn., where he built the well-known plant for manufacturing fire-arms, ammunition, and machinery. He laid the first successful submarine cable, in New York harbor, 1843, the core being protected by lead pipes, gutta percha not then having been discovered. See REVOLVER.

**Colton, Walter** (1797-1851), American author, was born in Rutland, Vt. In 1831 he was appointed a chaplain in the navy, and in 1846 he was made alcalde of Monterey, Cal., where he established the *Californian*, the first newspaper published in California. He communicated the first announcement of the discovery of gold to the Philadelphia *North American*. Some of his books of travel are *Ship and Shore in Madeira, Lisbon, and the Mediterranean* (1835), *Three Years in California* (1850), and the posthumous *Literary Remains* (1851), edited, with a memoir, by Henry T. Cheever.

**Colum, Padraic** (1881- ), Irish poet and dramatist, was born in Co. Langford, Ireland. He helped establish the Abbey Theatre; came to America in 1914. He wrote *Wild Earth*, *Anthology of Irish Poetry*, *Castle Conquer*, and *The Frenzied Prince*.

**Columba, St.**, also known as St. COLM and St. COLUMCILLE (521-597), Irish missionary, is stated to have been born at Gartán in Donegal, of Irish blood royal. Educated for the church, he founded many monasteries, including Derry and Durrow. Accused of causing the sanguinary battle of Culdreveny and excommunicated by an Irish ecclesiastical synod, he became an exile, and, with twelve followers, found his way to Hy, or Iona, off the west coast of Argyllshire, Scotland. There he founded a monastery, and began his life mission as 'the Apostle of the Highlands.' For one hundred and fifty years his church on Iona was the national church of Scotland. While connected with the church of Ireland, in various points of doctrine and ceremonial it was opposed to Rome, to which it owed no allegiance. It was a missionary church, and its organization was essentially monastic. The main authority for his life is St. Adamnan, who was abbot of Iona (679-704). Consult Smith's *Life of St. Columba*; Cooke's *St. Columba*; Metcalf's *Ancient Lives of Scottish Saints*.

**Columban, or Columbanus** (543-615), Irish missionary monk, sometimes called the Younger Columba, was born in Leinster. He went, in his fortieth year, to France, accompanied by twelve companions, and there founded successively the monasteries of Ane-

gray, Luxeuil, and Fontaine, in the Vosges. His adherence to the Irish rule for calculating Easter involved him in controversy with the French bishops in 602; and the courage with which he rebuked the vices of the Burgundian court led to his expulsion. After various travels he passed into Lombardy, and in 612 founded the famous monastery of Bobbio. His *Life* (Eng. trans. by D. C. Munro) was written within a century after his death by Jonas, one of his successors in the abbacy of Bobbio. Consult Montalembert's *Monks of the West*.

**Columbarium** (Latin), Latin term for a dove cote or pigeon house, applied figuratively to the niches or pigeon holes in a particular kind of Roman sepulchral chamber in which the urns (*ollæ*) containing the ashes of dead bodies burned were deposited. The names of the persons were inscribed underneath.

**Columbia** (from Christopher Columbus), a poetic name for the United States.

**Columbia**, city, Missouri, county seat of Boone co., 120 m. n.w. of St. Louis. It is the seat of the University of Missouri; p. 18,399.

**Columbia**, city, South Carolina, capital of the State and county seat of Richland co., on the Congaree River, just below the junction of the Broad and Saluda Rivers, 130 m. n.w. of Charleston. The city is the seat of the University of South Carolina (1805). Columbia was settled about 1700, and became the State capital in 1796. At the time of its occupation by General Sherman's army (Feb. 17, 1865), it suffered severely from fire. The commission form of government was adopted in 1910; p. 62,396.

**Columbia, British.** See **British Columbia**.

**Columbiad**, a heavy gun invented by Colonel Bomford, which combined the features of howitzer, mortar, and gun. It first appeared early in the 19th century, and was used until after the Civil War. See GUNS.

**Columbia, District of.** See **Washington**.

**Columbian Exposition.** See **World's Columbian Exposition**.

**Columbian University**, former name of **George Washington University**.

**Columbia River, or Oregon River**, one of the largest and most important rivers of North America, rises in the Kootenay district of British Columbia, on the western slope of the Rocky Mountains, in about 50° n. latitude. It has a very irregular course, generally s.w., through British Columbia and the State of Washington; forms the northern boundary of Oregon for about 350 m.; and enters the

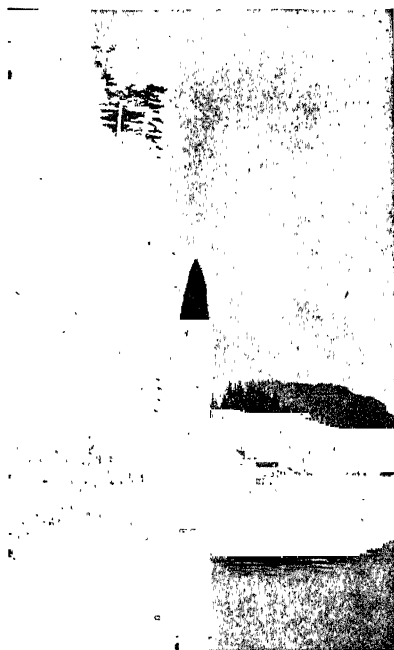
Pacific Ocean by an estuary 35 m. long and from 3 to 8 wide. On the left bank it receives the Clark Fork River, which rises in the Rocky Mountains of Montana, and joins it near the northern boundary line of Washington. Farther down it is joined by the Spokane and Okanagon Rivers, and near the southern boundary line by the Snake. Tributaries from the south are the John Day, Des Chutes, and Willamette Rivers. East of the Cascade Range

of 50 miles, extends to Dalles, where another railroad of 14 miles has been constructed past the Great Dalles channel, and the Dalles-Celilo canal (q.v.), 8½ miles long, allows the passage of light-draught vessels as far as Priest Rapids; immediately above this are two sections of the river of 185 and 250 miles respectively navigable for steamboats. Its mouth is the only deep-water harbor between Cape Flattery and San Francisco. On this river are the great Bonneville and Grand Coulee dam projects, the most costly of all the Federal power and irrigation projects of recent years.

The river is rich in fish, notably salmon, which annually ascend the river and its tributaries in vast schools, bass, sturgeon, smelt, and trout. The greatest belt of timber in the United States clothes the country from the eastern base of the Cascade Mountains through Oregon and Washington to the Pacific Ocean.

The longest settled and most densely populated part of the Columbia watershed is the Willamette Valley. Many thriving progressive cities and towns have grown up here, chief among them being Portland and Vancouver.

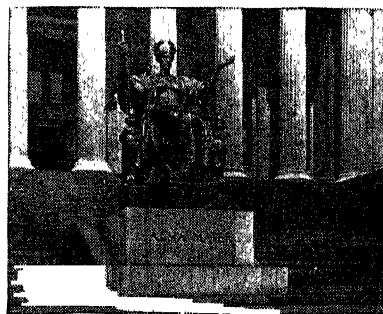
**Columbia River Highway**, a paved boulevard, 42 m. long, leading from Portland, Oregon, east to Hood River, traversing the picturesque Columbia River valley.



*Cape Horn, on the Columbia River.*

the region drained by the Columbia is arid or semi-arid. West of that range the rainfall is ample, and the country densely forested and well inhabited. The length of the Columbia is 1,400 m.

The course of the Columbia is broken by falls and rapids at many points. Owing to the vast amount of silt deposited as an effective bar at the mouth of the river, constant labor is entailed in clearing and deepening the channel, but the construction of a great jetty 2 ½ m. long has provided a good harbor. Sea-going ships steam 100 m. up from its mouth, and 10 m. up its great tributary, the Willamette, to Portland. It is open to steamboat navigation to the Cascades (160 miles), and goods are carried past the obstruction in the river for 6 miles by railroad; the next reach



*Columbia University Library, with figure of Alma Mater.*

**Columbia University**, an institution of higher learning in New York City, and one of the leading universities of the United States. It was established by royal letters patent in 1754 as King's College, and in 1755 the new college was given a parcel of land at the present Murray Street and West Broadway by the trustees of Trinity Church. The College was closed during the American Revolution (1776-84), and was then reopened as Columbia College, the control being vested in the newly created Regents of the University of the State

of New York. In 1787 a statute was passed, confirming the charter of 1754 for Columbia College in the City of New York. This remained the legal corporate title until 1912, when by order of the State supreme court it was changed to Columbia University in the City of New York.

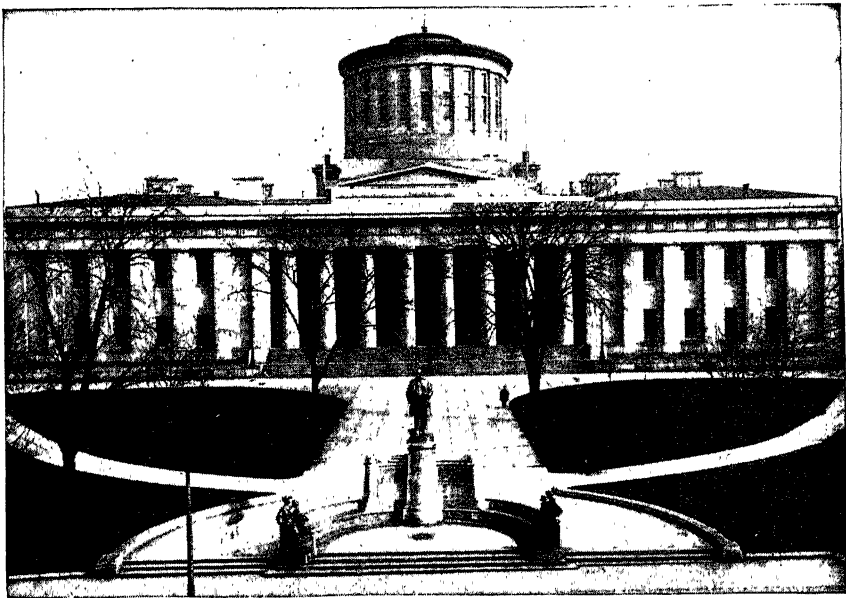
The first college building, at what is now Park Place and Church Street, was completed in 1760; and in 1767 the Medical Department was founded. In 1857 the College was removed to Madison Avenue and Forty-Seventh Street; in 1858 the Law School was established; and in 1864 the School of Mines was opened. At the

became affiliated with Columbia University.

Those who cannot attend as students of the University are offered opportunities in the Summer Session and in the system of University Extension and Home Study Courses.

The buildings of Columbia University occupy an attractive site of 78 acres on Morning-side Heights, and are grouped around the central Library. The College of Physicians and Surgeons and the School of Dental and Oral Surgery are now located at the Medical Center, Broadway and 168th Street.

University publications include *The Political Science Quarterly*, *Columbia Law Review*, and



Columbus, Ohio: State Capitol; McKinley Memorial in foreground.

end of forty years (1897) the College was again removed to its present site on Morning-side Heights, where the first five of a group of buildings had been erected. In 1900, Barnard College for women and Teachers College, and in 1904 the New York College of Pharmacy, became part of the University's educational system. The Faculty of Fine Arts, with schools of Architecture, Music and Design, was established in 1906, and in 1912 the School of Journalism, endowed by Joseph Pulitzer, was opened. In 1914 the School of Architecture was made a separate School. Seth Low Junior College, located in Brooklyn, was established in 1928 and that same year Saint Stephen's College in Annandale-on-Hudson

various student periodicals. *The Spectator* (daily), *The Jester*, *Morningside*, and *Varsity*.

The presidents of the University have been: Samuel Johnson (1754); Myles Cooper (1763); William Samuel Johnson (1787); Charles H. Wharton (1801); Benjamin Moore (1801); William Harris (1811); William A. Duer (1830); Nathaniel F. Moore (1842); Charles King (1849); Frederick A. P. Barnard (1864); Seth Low (1890); Nicholas Murray Butler (1902-1945).

Consult *History of Columbia University, 1754-1905* (Columbia University Press, 1904); Slosson's *Great American Universities*; *Official Guide to Columbia University* (1912); Keppel's *Columbia* (1914).

**Columbine**, one of the characters in pantomime, the daughter of Pantaloon and the sweetheart of Harlequin. See PANTOMIME.

**Columbine** (*Aquilegia*), a genus of Ranunculaceae, with five colored sepals, which soon fall off, and five petals each terminating below in a horn-shaped nectary. The name (from Latin *columba*, 'a dove') is derived from the resemblance of the flower to a cluster of doves. The garden columbines of our ancestors were all varieties of the European blue or white species, *Aquilegia vulgaris*. Among the cultivated species are the common native, rock-loving columbine, *A. canadensis*, with red and yellow petals and sepals; the dwarf blue *A. pyrenaica*; and the hybrid *A. Stuarti*, with large lilac and creamy flowers.

**Columbite**, a mineral containing iron and manganese, closely allied chemically to the mineral tantalite (see TANTALUM). Columbite is iron black, grayish, or brownish in color, with a bluish iridescence. It is found in many of the Eastern States of the United States; also in Germany, Italy, and the Ural district. Its only economic value is for the preparation of salts of niobium and tantalum.

**Columbium**. See Niobium.

**Columbus**, city, Georgia, county seat of Muscogee co., on the Chattahoochee River, 115 m. s.w. of Atlanta. The city is the second largest cotton manufacturing city in the south. Eight m. from the city, on a 97,000-acre tract, is Fort Benning, greatest U. S. Infantry School, also a flying field, with a staff of over 5,000. Most of the Army officers are trained here. Columbus was laid out in 1827. In the Civil War it was a supply depot, and was captured by Federals in the last battle, April 16, 1865; p. 53,280.

**Columbus**, city, Ohio, capital of the State and county seat of Franklin co., is situated on the east bank of the Scioto River, at its junction with the Olentangy, on the Ohio Canal, 120 m. n.e. of Cincinnati, and 135 m. s.w. of Cleveland. It is built on rolling ground at a height of about 750 ft., and covers a total area of nearly 23 sq. m.

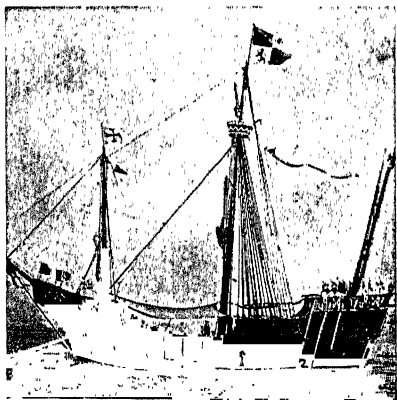
Situated near the large coal and natural gas resources of Hocking Valley, and in the midst of a rich stock-raising and agricultural district, Columbus has important commerce and manufactures. The leading industries are the manufacture of iron and steel products, especially mining machinery and steel railroad cars, agricultural implements, automobiles, shoes, flour, caskets, glass and teeth. There is a large trade in coal from mines in the neighborhood.

Columbus has a modified federal type of gov-

ernment, with a mayor and a council of seven members elected for four-year terms. The population of Columbus is 290,564. The city has had a steady growth as shown by the census figures: in 1830, 2,435; in 1850, 17,882; in 1870, 31,274; in 1890, 88,150; in 1900, 125,560; in 1910, 181,511; (1940) 304,936.

The first white settlement in the vicinity was made in 1797 by Lucas Sullivant and others at Franklinton, on the west side of the Scioto River. In 1812 the present site was chosen for the capital of Ohio, and given the name of Columbus. In 1816 Columbus was made a borough; in 1834 it received a city charter; and in 1870 Franklinton was annexed. The city was visited by pestilence in 1823-4, by cholera in 1832 and 1849, and by a severe flood in 1913 (see UNITED STATES, *History*).

**Columbus, Bartolomeo** (?1445-1515), brother of Christopher Columbus, was born in Genoa. He possibly accompanied Bartolomeo Diaz on his voyage to the Cape of Good Hope (1486-7), and in 1489 he was sent by his brother to seek help from Henry VII. of England and from Charles VIII. of France, but failed in his purpose. Later he commanded the auxiliary fleet despatched after Columbus sailed on his second voyage. As his brother's vicegerent he governed Hispaniola (1496-1502) with vigor and success, and founded Santo Domingo.



*Columbus' Ship, the 'Santa Maria'.*

**Columbus, Christopher** (1446-1506), in Italian CRISTOFORO COLOMBO, and in Spanish CRISTOBAL COLON, the discoverer of the New World called America, was born in the neighborhood of Genoa, and went to sea at the age of fourteen. He settled at Lisbon, and during the next few years made many voyages to

Madeira and the Azores, and in 1477 one to the Northern seas. Gradually there grew up in his mind the conviction that it was possible to reach India by sailing westward. After making a vain appeal to the senate of his native state, Genoa, he turned to the king of Portugal, but without result; then to Henry VII. of England and to the dukes of Medina Sidonia and Medina Celi, who advised him to appeal to Isabella of Castile. But it was not till after seven years of heart-breaking delays that Columbus' proposals were accepted by the Spanish rulers (April 17, 1492).

On Aug. 3 Columbus set sail from Huelva, with one small ship, the *Santa Maria*, and two caravels, the *Pinta*, in command of Martin Alonzo Pinzon, and the *Nina*, the whole expedition including only 120 men. The little fleet first made the Canary Islands, whence it sailed westward on September 6 on the real voyage of discovery. Land was sighted on October 12; and the expedition disembarked, taking possession, in the name of their Catholic Majesties of Castile and Leon, of a small island in the Bahamas, called by the natives Guanahani but named by Columbus San Salvador—probably what is now known as Watling Island. Cuba was discovered on October 28, and the Island of Haiti, to which Columbus gave the name Hispaniola, a little more than a month later. On January 4, 1493, the *Santa Maria* having been wrecked, the party embarked on the two caravels and set sail for Europe, and after a stormy voyage during which the two vessels were separated, Columbus cast anchor at Palos, March 15, 1493.

Upon his arrival at the Spanish court, Columbus was received with great honors, and a second expedition of seventeen vessels and 1,500 men was immediately fitted out and placed at his command. This sailed on September 24, 1493, and reached the island of Dominica in the West Indies on November 3d. After two years spent in exploration of the newly-discovered islands, including the island of Jamaica, discovered May 14, 1494, and in attempt at colonization, Columbus returned to Spain, reaching Cadiz in June 1496. A new fleet of six vessels was fitted out, and on May 30, 1498, the explorer set forth upon his third voyage, which resulted in the discovery of Trinidad, and of the mainland of South America (Aug. 1, 1498), and from which he returned (1500) in irons by the authority of Bobadilla, newly-appointed royal governor of Hispaniola. He was, however, speedily restored to favor, by the king and queen, and having been granted a fourth fleet with which

to pursue his explorations, he embarked in 1502 on his last voyage (1502-4), during which he explored the south shore of the Gulf of Mexico.

Broken in health, Columbus returned to Spain in 1504, and two years later (May 20, 1506) he died at Valladolid. There he was buried, but his bones were later removed to Seville (1513), then to Santo Domingo, in Hispaniola (1536), to the Cathedral in Havana (1796), and again, after the Spanish-American war of 1898-9, to Seville.

Columbus' eldest son, Diego (about 1480-1526), was the heir to his honors, merits, and misfortunes. The great discoverer left also a natural son, Don Fernando (1488-1539), who wrote an important life of his father, preserved only in an Italian translation.

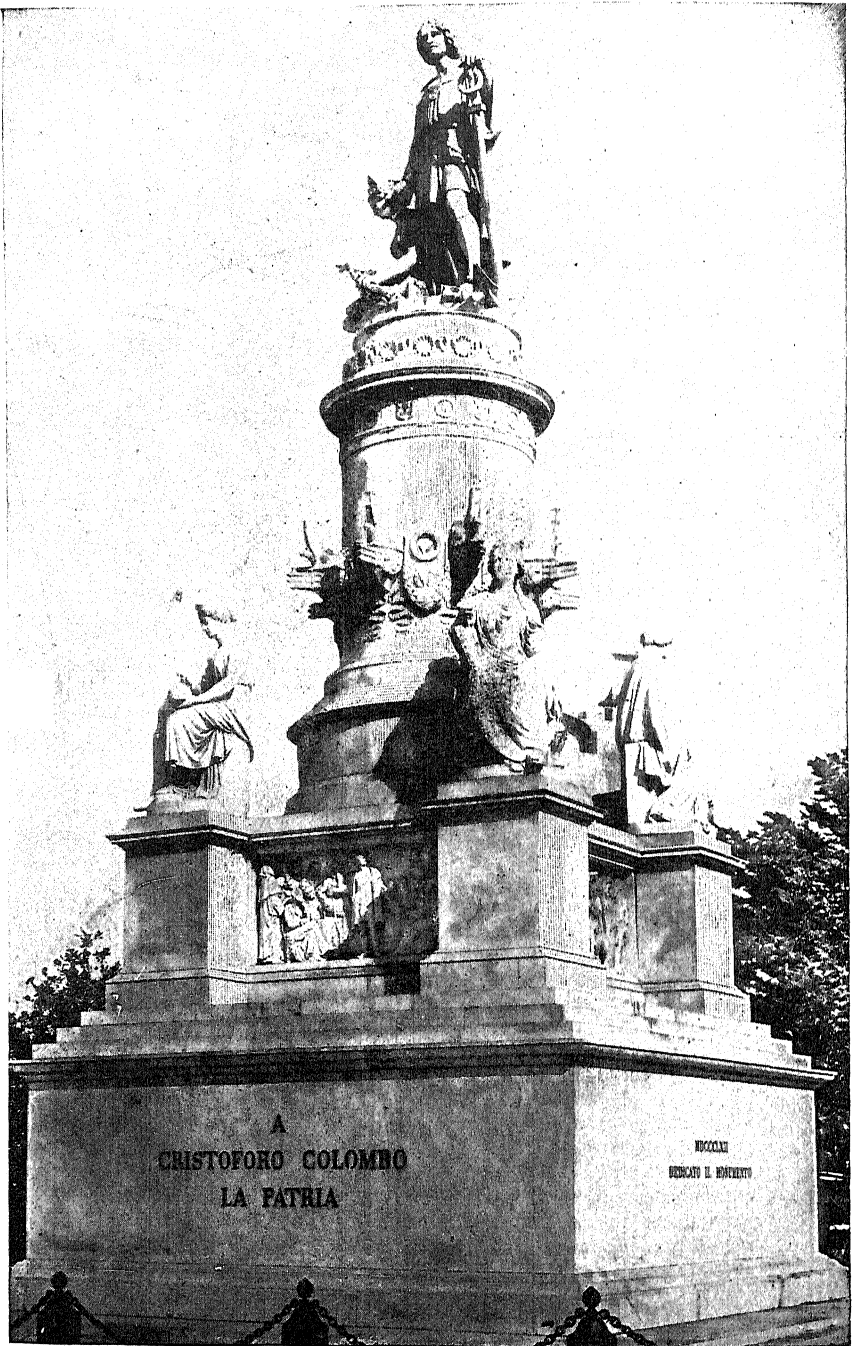
**Bibliography.**—The great critical study of Columbus' life and family is by Harrisse (Eng. trans. by Winsor). Consult also the *Life* of his son Fernando, biographies by Washington Irving, Sir A. Phelps, Markham, and Adams.

**Columbus Day**, October 12, a day set apart by most of the States of the United States to commemorate the discovery of America by Columbus on Oct. 12, 1492.

**Columbus, Knights of**, a fraternal Roman Catholic beneficiary organization established in February, 1882, in New Haven, Conn., and incorporated under the Connecticut laws, March 29 of the same year. The society is secret but has no oath, and is degree-conferring, having four degrees of ceremonial, representing charity, unity, fraternity, and patriotism. Membership is limited to Roman Catholic men. The system of insurance is based upon the Fraternal-American Table of Mortality and is recognized by Insurance Commissioners as being founded on a sound, safe, and scientific basis. (See FRATERNAL INSURANCE.)

In addition to its insurance features, the order is devoted to the promotion and protection of Catholic interests and the interests of Catholic men and women; and aims to propagate Catholic doctrine from the platform and by literature. It has endowed a Chair of American History at the Catholic University of America, and maintains fifty perpetual free scholarships at the same institution. The observance of Columbus Day is due largely to the concerted efforts of the members.

Branches of the Knights of Columbus exist in every State and territory of the continental United States, as well as in the Canadian provinces, Newfoundland, Cuba, the Canal Zone, Panama, the Philippine Islands, Mexico, and Porto Rico. The official organ is the *Colum-*



*Statue of Columbus at Genoa, his Birthplace.*

*biad.* Headquarters are at New Haven, Conn.

Upon the entrance of America into the Great War in 1917, the Knights of Columbus instituted an extensive war work. In 1939 the order was active in a crusade against communism. It has 2464 councils and a total membership of about 430,000.

**Columella, Lucius Junius Moderatus**, Latin writer, was a native of Gades in Spain. He appears to have lived at Rome, and was contemporary with Seneca (1st century A.D.). He has left by far the fullest ancient treatise on agriculture, *De Re Rustica*; and also a supplementary treatise on trees, *De Arboribus*. Consult Barberet's *De Columella Vita et Scriptis*.

**Column**, in architecture, a cylindrical or polygonal post of wood or stone employed for the support of an entablature or other superstructure, and consisting usually of a base, which may, however, be lacking as in certain Egyptian columns, a shaft, and a capital. The column is presumably derived from the primitive use of the stems of trees in a similar position. It was first developed by the Egyptians, was employed to a limited extent in Assyria and Persia, and became a characteristic feature of Greek and Roman architecture.

The varieties of Egyptian columns are numerous, the common type being one or another form of the plant world. These include the lotus column and one supposed to be the prototype of the Doric order.

Greek columns of the different orders, while they differ from one another in proportions, mouldings, and ornaments, yet retain essentially the main form throughout. The Doric style in its earliest and rudest form, of which the temple at Corinth is an example, is slightly tapering, fluted, with narrow fillets and a simple unadorned capital. There is no base. The Ionic column rises from a base composed of mouldings. It is of more slender proportions, the capital is more richly decorated, the flutings in the shaft are more numerous, and the fillets broader. A refined example is that of the Erechtheum at Athens. The Corinthian column is slender and fluted. The capital springs from a bell-shaped ornament of great enrichment, conventionally treated, the decorations rising over the capital, the abacus curved and graceful. The monument to Lysicrates at Athens shows a beautiful example of this type of column.

Roman columns represent a further development of the Greek, the Roman Doric, Roman Ionic, and Roman Corinthian closely resembling their Greek prototypes. Classical and

semi-classical columns continued to be used in the architecture of the early Middle Ages, but were later replaced by the clustered piers and shafts of the Romanesque and Gothic orders. They were revived and variously modified during the Renaissance, and form a conspicuous feature of modern architecture.

The Monumental or Memorial Column is essentially similar in form to the architectural column, consisting of base, shaft, and capital, but carrying no heavy superstructure. It is erected independently and may support a statue, bust, vase, or other emblematic object.

Monumental columns were known in the east many hundreds of years before Christ, they are found also in archaic Greece, and are especially characteristic of the Roman period either in commemoration of a military or naval triumph or as a statue to some great civil or military leader. Famous monumental columns are the Antonine column of Rome, 136 ft.; the Colonne Vendôme, Paris, 116 ft.; the Duke of York's, London, 95 ft. See ARCHITECTURE, especially the section on *Classic Orders*. Consult Longfellow's *The Column and the Arch*.

**Column**, a military formation in which the elements are placed one behind another, as distinguished from a line formation in which the elements are abreast of each other. Previous to the introduction of the breech-loading rifle, and the consequent increase in the advantages of a wide front of fire, most European nations fought in column. Troops on the march use the column formation for reasons of supply and tactics, and to accommodate themselves to any narrow roads over which they must advance.

**Columna Rostrata**, a triumphal pillar erected in the Forum at Rome to commemorate the victory of Duilius over the Carthaginians off Mylae (now Milazzo, on the north coast of Sicily), in 260 B.C. It was so called because it was decorated with the rams or beaks (*rostra*) of the captured vessels.

**Colures**, in astronomy, great circles of the sphere drawn from the celestial pole through the solstices and equinoxes, thus dividing the equator and ecliptic each into four equal parts. The former is called the solstitial, the latter the equinoctial colure, or zero hour-circle.

**Colville, Sir Henry Edward** (1852-1907), British army officer, was born in Kirkby Mallory, Leicestershire. He went to Cape Colony as commanding officer of a brigade of Guards during the Boer War. His failure to relieve Broadwood's column at Sanna's Post and Spragg's force at Lindley caused



his recall to England in July, 1900. Lord Roberts subsequently appointed him to the command of the Ninth Division, and in that capacity he was actively engaged in the operations which culminated at Paardeberg (Feb. 27, 1900). He was the author of several works, including the official *History of the Sudan Campaign* (1886), and *The Allies, England and Japan* (1907).

**Colvin, Sir Sidney** (1845-1927), English literary and art critic, was born in Norwood, Surrey. After his graduation from Cambridge University, he became Slade professor of fine art (1873-85) at that institution, until appointed keeper of prints and drawings, British Museum, a position he occupied until 1912. He was knighted in 1911. His published works include *Life of Walter Savage Landor* (1881) and *Life of Keats* (1887), in Morley's English Men of Letters; *Selections from Landor* (1882) in Golden Treasury Series; *Letters of Keats* (1887); *Stevenson's Works* (Edin. ed.); *Letters of Robert Stevenson*, etc. (1894-7) and many fine critical articles for various periodicals. He was a well known correspondent of Stevenson, and wrote the article on that author in the *Dictionary of National Biography*.

**Colza, or Rape Oil**, an oil obtained from the seed of several species of Brassica, cultivated chiefly in Europe and in India, by crushing, followed by pressing, or extraction with a solvent. It is chiefly used for illuminating and lubricating purposes, and, to a less extent, for making soap.

**Coma**, (Gr. 'lethargy'), a state of absolute insensibility, without movement or volition, differing from sleep in respect to the difficulty or impossibility of rousing the comatose person. Coma is frequent at the end of long, severe illness, and the sufferer gradually drifts from coma to death. It is also found in cases where there is extra pressure on the brain.

**Coma Berenices**, a small constellation n. of Virgo, supposed to represent the yellow *chevelure* of Berenice, wife of Ptolemy Euergetes. Although referred to by Eratosthenes (276-196 B.C.), it was first definitely located on the sphere by Tycho Brahe in 1602. The north pole of the Milky Way is situated near the sixth magnitude star 30 Comae Berenices.

**Comanches**, a tribe of North American Indians, a main branch of the Shoshonean family, who appear to have dwelt originally in the Snake River valley. In more recent times they ranged chiefly about the headwaters of the upper Red River, the Arkansas, and the Rio Grande. But all were later gath-

ered into the Kiowa, Comanche, and Wichita Reservation, Indian Territory, until in 1901 that region, now part of Oklahoma, was thrown open to white settlers. The Comanches were a terror especially to the white settlers on both sides of the Rio Grande, by whom they were called the 'Tartars of the Desert.' They are now settled in West Oklahoma, and number about 1,400.

**Comayagua**, town, Honduras, Central America, capital of the department of Honduras, and until 1880 the capital of the republic. It is beautifully situated in a plain at about equal distances from the Atlantic and Pacific Oceans. It was destroyed by Guatemala in 1827; p. 9,000.

**Comb** (in poultry), the name given to the fleshy appendage on the crown of the head which is characteristic of the members of the genus *Gallus*, the genus to which the domesticated fowl belongs. The wattles seen in tragopans and in other members of the game-bird tribe are analogous structures. In the different breeds of poultry the size and shape of the comb are of great importance to the fancier, and are distinguished by various names.

**Comb**, a toothed instrument to dress the hair; used also by women to keep their hair in position when dressed. Combs are made of thin plates, plain or curved, of wood, horn, tortoise-shell, ivory, bone, metal, or vulcanite, cut on one or both sides with long teeth.

The comb is probably of Egyptian origin; both wooden and ivory combs, toothed on one or both sides, have been found in ancient Egyptian, Greek, and Roman tombs. Highly decorated combs are prominent among the curios of old Japan and in the 16th, 17th and 18th centuries combs were among the most elaborate articles of adornment in France, Germany, England and Italy. There are many famous collections of combs, notably that in the Kensington Museum, London.

The founder of the comb industry in the United States was Enoch Noyes, who lived in West Newbury, Mass. Early tradition says that he cut his first combs from horn with a jack-knife and the date is given as 1759. Since those early days there has been a great development in the comb industry and at present the process is entirely one of machinery. Leominster, Mass., is the leading city of the United States in the comb making industry.

**Combaconum, or Kumbhakonam**, town, India, in Tanjore district, Madras Presidency, 22 miles n.e. of Tanjore. It was formerly the capital of the Chola kingdom, and a town of

pilgrimage. It has a government college, and is an important centre of Hindu learning; p. 64,600.

**Combat, Trial by.** See **Battle, Trial by.**  
**Combe,** a narrow steep-sided valley.

**Combe, George** (1788-1858), Scottish lawyer and phrenologist, was born in Edinburgh. He founded the *Phrenological Society* in 1820 and three years later started the *Phrenologica Journal*. He made a tour through the United States (1838-40). His *Constitution of Man* (1828) is his best known work.

**Combe, William** (1741-1823), English author, was born in Bristol. He wrote many sketches, satires, and magazine articles but is best remembered by his *Three Tours of Doctor Syntax* (1812-21), written in verse and abounding in humor.

**Combermere, Stapleton Cotton, First Viscount** (1773-1865), English soldier, was born in Denbighshire. He was created Baron Combermere in 1814, and viscount in 1827. He was commander of the forces in the West Indies (1817-20), commander in chief in Ireland (1822-5), and in India (1825-30). He was made a field marshal in 1855.

**Combes, Justin Louis Emile** (1835-1921), French statesman, was born in Roquecourbe (Tarn). He was vice-president of the Chamber from 1893-5 and became minister of public instruction in 1895-6, when he introduced many measures for the reorganization of primary and secondary education. On the retirement of Waldeck-Rousseau he became prime minister (June, 1902). His policy of vigorous hostility to the Catholic Church led to the suppression and expatriation of many great religious orders. His ministry fell in January, 1905, when he was succeeded as premier by M. Rouvier.

**Combin, Grand, or Graffeneire,** the culminating point (14,164 ft.) of a grand isolated mountain group midway between the Mont Blanc and Monte Rosa ranges, and s.e. of the Great St. Bernard. The vast glacier of Corbassiere flows north from it towards the Val de Bagnes. It is wholly in the Swiss canton of Valais.

**Combinations.** See **PERMUTATIONS.**

**Combinations, Business, and Mergers,** the union or merging of two or more organizations for increased productivity and efficiency. In trade the process of combination has gone on from ancient days. Individual traders, using one camel or one 'sampan' (boat) each, soon discovered that they were at a disadvantage. Bandits overcame them too easily, and there was too limited a scope. As a result, in

a short time, there were *caravans* which were the precise primitive counterparts of a U. S. Steel Corporation or General Motors Corporation; consolidations of many units, and subdivision of labor within one big unit. The war-loving Romans and Alexander ruined the trade structure of the world, and for many centuries trade was carried on by individual trading. Then slowly organization and consolidation developed in Venice, until the 'Rialto' became the world trade centre, with organization on a large scale. A series of greater consolidations soon followed—i.e. the Dutch East India Company, the Hanseatic League, the Union of Utrecht, and similar organizations. Later came the Hudson Bay Company and other vast enterprises reaching many thousands of miles from their base.

Europe, before America was discovered, had, therefore, progressed considerably toward trade combinations, but America had to proceed all the way from primitive pioneer conditions in the seventeenth and eighteenth centuries to about the year 1875 before there began to appear anything suggesting the consolidation which was already known abroad.

Once America started, however, to use the large-scale tool of consolidation, she used it with vigor, and it is at the present time in the prime of its development. The early attempts at combination, of which the famous Standard Oil Company is an outstanding illustration, were attended by such abuses and political corruption that it became necessary for the U. S. Government to intervene and the Sherman Anti-Trust Law, and later, other governmental regulations, were enacted which have resulted to the satisfaction of the public and of business. From the start there had been confusion between natural or beneficial monopoly and dangerous monopoly, on the one hand, and between all monopoly and mere consolidation and large-scale enterprise on the other hand. Patent rights are government-granted monopolies; whereas an attempt to own 65 per cent. of all the bread-baking companies in the United States would be regarded as a dangerous monopoly.

Combinations and mergers, however, are increasing at a tremendous rate. It is particularly notable of mergers in recent years that they have been mainly among large and successful, not weak, firms; that they have been formed, mainly for reasons of distribution economy; that they have been financed largely by the public, rather than by private bankers; that most conspicuous in merging have been three lines of business: public utilities, banks

and foodstuff manufactures; that the management of consolidations is passing into the hands of technical managers, on an absolutely strictly merit basis.

The summarized benefits of consolidations are as follows: Immediate or ultimate reduction of price to consumer; Higher grade management and special technical ability; Highly efficient plants only, used in dull times and run at full capacity whenever possible; Specialization of plants; Comparative tests; Large capital for experiments, etc.; Full use of patents and of best methods; Utilization of waste for by-products; Duplication of high-priced officials dispensed with; Saving in cross freights; economy in advertising and salesmen; Better credit and better discounts; Less credit given and fewer bad debts; Middlemen regulated; Steady prices (supply adjusted to demand); Strength for export business; Cheaper raw material, bought in largest quantities and from nearest sources.

Even in manufacture and in transportation the special touch, style, service and quick adaptability provide opportunities for small men to compete with large-scale enterprise, and the day of 'the small man' is far from over.

There are now definitely marked types of combination. Physically speaking there is the vertical consolidation, like the U. S. Steel Co. or Henry Ford, who own the mines from which the ores come, the coal with which to smelt it, the railways to haul it, and the mills to make it. There is the horizontal consolidation which, like the International Paper Company, owns many paper mills. There is the latest type—the circular consolidation, which like the General Motors Corporation, manufactures many articles—automobiles of various price levels, trucks, buses, spark plugs, lighting systems, electric refrigerators, aeroplanes—because they require the same general type of skilled labor and specialty marketing organization.

Generally speaking, there are three types of mergers, the refinancing consolidation, made from the basis of coördinating the financial ownership or capital stock structure; the production merger, which is a seeking after reduced manufacturing economy; the distribution merger, which, as in the cases of the Postum Company, the Borden Company, or the Gold Dust Corporation, are mergers based on the fact that the goods are all sold through the same type of sales organization and advertising.

Re-equipment is often a starting motive for consolidation. So are research, the re-

shaping of goods for the market, or new inventions. Combination is simply one of the large levers used frequently for keeping in line with progress. See also TRUSTS. Consult Frederick's *Modern Industrial Consolidation*.

**Combining Weights**, or equivalents, in chemistry, are the ratios of the weights, or more strictly of the masses, of elements entering chemical combinations as compared to a fixed weight of a standard substance with which the element in question combines or which it replaces in a chemical combination. John Dalton arrived at the valuable generalizations or laws of chemical combination which are known as the law of definite composition and the law of multiple proportion. The first states that all chemical compounds have definite compositions which cannot be changed without altering the nature of the compound. The law of multiple proportions states that if more than one compound of two elements exist, the proportion of one element in the combinations to a definite amount of the other is a simple integral whole number.

The combining weights of the element may be determined either by analysis or synthesis of its compounds. Formerly, the standard of comparison in determining combining weights was a precise unit weight of hydrogen, but because it was easier to make comparisons with oxygen, a weight of oxygen approximately 8 times that of hydrogen was adopted as the unit. The tables of combining weights are now ordinarily called tables of atomic weights because the atomic theory has led to the belief that chemical combinations take place between atoms which are of different weights for the different elements. The necessity for the most precise accuracy in the determination of these fundamental constants of matter comes about through the fact that all quantitative chemical datas are based upon them.

**Combustion**, or **Burning**, a chemical reaction in which sufficient energy is evolved to bring the uniting bodies to a red heat. Modern chemistry may be considered to be founded upon a correct explanation of the phenomenon of combustion. Before the time of Lavoisier, combustion was considered to be the separation of phlogiston, a body of negative weight, from the burning material. Lavoisier, however, showed that combustion, as ordinarily understood, can only take place by the union of a combustible material with oxygen. This conclusion led to a complete revolution in chemical thought and on it is based the present day theory. In ordinary combustion, such as that of a piece of wood, oxygen of the air

unites with the elements present in the wood so rapidly and with such vigor that enough heat is evolved to produce visible heating. Many substances unite with oxygen vigorously enough to bring about a degree of heating of this magnitude. However, all combustion need not necessarily involve oxygen, although there must be present at least two substances which enter into direct chemical combination. They are ordinarily spoken of as the com-

essentially a religious play. See DRAMA, and compare COMMEDIA.

**Comédie Française**, or **Théâtre Française**, often referred to by French writers as *La Maison de Moliere*, may be traced back to the year 1658, when Moliere's theatrical company, known as L'illustre Theatre, arrived in Paris from the provinces. In 1680 Louis XIV. ordered this company to amalgamate with the Theatre du Marais, a rival establish-



*A Comet, losing its tail and forming new ones.*

bustible and the supporter of combustion. A flame need not necessarily be present in combustion. A flame cannot, however, be present unless there is combustion.

**Comedia**, in the history of the Spanish drama, means a three-act play, either of serious or humorous import, and dealing with subjects of worldly interest; it was thus distinguished from the one-act *auto*, which was

ment, under the name of the Comedie Française. The following year the king settled 12,000 livres annually on the actors. After 1688 a commodious house was built for them, and this they continued to occupy for eighty-three years, during which they produced not only all Moliere's works, but likewise the comedies of other leading playwrights of the day. The present Odeon stands on the site of

the house which the Comedie Francaise occupied in 1782. In 1793 the company was suppressed by the revolutionists. But Napoleon, by his decree of 1803 and the decree of Moscow (1812), gave the theatre the organization which it still preserves, and established it in the building which it occupied until the fire of 1900.

M. Francisque Sarcey says that the history of the Comedie Francaise is a perpetual compromise between tradition and the taste for novelty. To realize how powerful tradition is in this case, and how it continues to be a living force, it is only necessary to point to the chain of actors who link the mind of Coquelin with Moliere's. There are no star actors. Authors whose plays are performed are allowed a fraction of the receipts varying from a twelfth to a twenty-fourth. On March 8, 1900, fire played havoc with the famous building, which was a veritable treasure-house of statuary, books, and pictures; the library included the archives of the Comedie Francaise from its birth. Happily, almost everything was saved, and on March 20, 1900, a grant of 220,000 fr. was made by the state toward the rebuilding of the theatre. The reconstruction was made by Guadet.

The Comedie Francaise has been the home of many of France's most illustrious actors and actresses, among whom are Mlles. Mars, Rachel, Bernhardt, and Lecouvreur, and M. Talma, and M. Mounet-Sully.

**Comedy.** See **Drama**.

**Comenius, or Komenski, John Amos** (1592-1670), scholar and pioneer educational reformer, was born in Ungarisch-Brod or Nivnitz in Moravia. In 1618 he was appointed pastor at Fulnek, but all his property and library were destroyed when the town was sacked by the Imperialists (1621). Taking refuge at Lissa (1628) in Poland, he wrote his *Didactica Magna* (1632; new ed. 1893), in which he elaborated his new theory of education. In 1641 he went to England, but the outbreak of the civil war drove him to Sweden. In 1648 he was elected bishop of the Bohemian Brethren, and again took up his residence at Lissa whence he was driven by a Polish attack in 1656, losing his possessions again, the loss this time including several mss. Eventually he found an asylum at Amsterdam, and remained there until his death. In his theory of education he is the forerunner of Rousseau, Froebel and Pestalozzi. Consult Monroe's *Comenius and the Beginnings of Educational Reform*.

**Comenius Library and Society.** The for-

mer was founded on the bicentenary of Comenius' death, in 1871, at Kassel, and numbers many thousand volumes and pamphlets, all more or less bearing upon the views advocated by the educational reformer whose name the institute celebrates. The latter, founded in Berlin in 1891, commemorates the tercentenary of Comenius' birth, and aims at spreading the spirit of his teaching.

**Comet**, a nebulous body revolving round the sun. About eight hundred such objects have made recorded appearances, and for upwards of one-half of them orbits have been computed. They travel for the most part in long ellipses indistinguishable from parabolas, inclined at all angles to the ecliptic; their motion is retrograde as often as direct, and their periods are very uncertain. Of the rest, half a dozen are hyperbolic, but almost certainly as the result of perturbations; while some seventy-five, which pursue unmistakable ellipses, can be depended upon to return to the sun. Twenty-five have been observed at one or more returns.

*Halley's Comet* is the most famous of these heavenly bodies, and was the first to make a predicted return. Edmund Halley was a distinguished English astronomer, friend of Sir Isaac Newton. He discovered that the orbits of the comets of 1531 and 1607 were similar to that of 1682, which he himself observed, and thereupon concluded they were one and the same. He predicted the comet's return about 1758, and called upon posterity to record and verify his prediction. It arrived at perihelion on March 12, 1759. In 1885 it returned again, and was next expected in 1910. While yet some 300,000,000 m. distant, it was photographed on Sept. 11, 1909, by Prof. Wolf of Heidelberg. For months afterward, it was invisible to the eye; later it developed rapidly and was a spectacular object when it reached its greatest brilliance in May, 1910.

Comets at a distance from our system are misty, amorphous objects. Structure develops in them through solar influence. As it strengthens with approach, the nucleus, a minute disk of condensed light, begins to shine brilliantly, paraboloidal envelopes are successively thrown off from it; then, usually in a direction diametrically anti-solar, the tail issues with extreme rapidity, extending in some cases to lengths of one hundred million miles or more. The fact that the tail precedes the comet, in its departure from the neighborhood of the sun, proves that the material of the tail, after ejection from the head of the comet, is repelled from the sun, and that it is

not simply material left behind by the comet in its progress through space.

Modern theory identifies the repulsive force with the pressure of solar radiation. Only for very small particles would the pressure exceed the gravitational attraction. Comets give spectra mainly composed of bright bands due to hydrocarbons; radiations of sodium and iron were also observed in the comet of September, 1882. Continuous light is present in varying degrees of intensity. The continuous background of the spectrum is probably reflected sunlight, but the bright lines are due to the comet's own luminosity.

There is no evidence that comets are transients from outside which happen our way. The parabolic orbits are probably very long ellipses. The comets seem to have had their origin in an aggregation of cosmical matter, far from the sun, but moving with the solar system.

The genetic relationship of comets to meteorites, established by Schiaparelli in 1866, lends further countenance to the supposition that they eventually disintegrate into dust, and of their quondam splendor preserve only the fitful gleam of a shooting star. On June 23, 1927, appeared the Pons-Winnecke comet, named after the astronomer who discovered it. It more nearly approached the earth than has any comet in recent times. Consult Ball's *In the Starry Realm*; Lynn's *Remarkable Comets*; Chambers' *The Story of the Comets* (1909); Elson's *Comets* (1910); Merson's *Comet Lore* (1910).

In May, 1936, an amateur astronomer, Leslie C. Peltier, discovered a new comet, at that time about 130,000,000 miles distant. By the beginning of August it had approached to within 15,800,000 miles of the Earth. In 1940 Leland Cunningham discovered a comet about 100,000,000 miles away with a tail more than 2,000,000 miles long.

**Comet Seeker, or Comet Finder**, a telescope with large aperture and comparatively small magnifying power, adapted to searching for comets.

**Comfort, George Fisk** (1833-1910), American educator, was born in Berkshire, N. Y. He helped to organize the American Philological Association and the Metropolitan Museum of Art in New York City. In 1872 he founded the Syracuse College of Fine Arts, and was its dean (1873-93). He wrote: *Art Museums in America* (1869); *Modern Languages in Education* (1870), a series of German text books; *The Land Troubles in Ireland* (1808).

**Comfrey** (*Symphytum*), a common genus of Boraginaceae, somewhat coarse perennial herbs. *S. officinale* bears drooping cymes of yellowish or purplish flowers in summer, and has hairy, leafy stems. It resembles borage in taste, and its young leaves and blanched shoots are still occasionally used as a boiled vegetable. It was formerly esteemed as a vulnerary. The prickly comfrey (*S. asperrium*), a native of Siberia, six to ten feet in height, has been recommended for feeding cattle.

**Comic Opera**, a combination of dialogue and music, both specially composed in the spirit of comedy. Its typical national forms have been the *Opera Buffa* of Italy, the *Opera Bouffe* of France, the *Singspiel* of Germany, and the ballad opera, and later the Gilbert and Sullivan type, of England.

In Italy it became customary to introduce into the *entr'actes* of the heavy and artificial grand opera, light musical sketches of everyday life, without limitation as to form. These proved popular, and were presented as separate entertainments, known as *opera buffa* which were sung throughout, the dialogue being in recitative. The *singspiel* of Germany was a more or less farcical entertainment in which spoken dialogue was interspersed with music. Its most notable exponent was Hiller, whose fourteen *singspiele* are still occasionally performed. The form developed into the romantic opera, of which examples are Mozart's *Die Zauberflöte*, Beethoven's *Fidelio*, and Weber's *Die Freischütz*. The *opera comique* of France resembled the *singspiel* in having the dialogue spoken instead of sung, as in the *opera buffa*. Typical *operas comiques* are the works of Cherubini, Lesueur, and Mehul, Meyerbeer's *Etoile du Nord* and *Dinorah*, Thomas' *Mignon* (1866), Bizet's *Carmen* (1875), Delibes' *Lakme* (1883), and Massenet's *Manon* (1884). The comic opera of France is the *opera bouffe*, which had its origin in the middle of the 19th century with the musical burlesques of Offenbach.

In England, Gay's *Beggar's Opera* (1728) started the vogue of the so-called ballad opera. It consisted of a burlesque by Gay of the fashions and customs of the day (including the artificial Italian opera), interspersed with English and Scottish ballads and popular airs, arranged by Dr. Pepusch. Modern English comic opera, which finds its origins in the *singspiel* and the *opera bouffe* of Offenbach, is represented by the works of Gilbert and Sullivan. Composer and author combined to produce their effects, the metrical ingenuities of Gilbert

being translated into music of equal ingenuity and exquisite melody by Sullivan. American comic operas of note are *Robin Hood* and *Rob Roy* by Reginald De Koven. The form has recently been superseded in both England and the United States, by musical comedy, which demands no consistency of plot, and sets a lower standard of musical composition and performance. See *OPERA*.

**Comines**, or **Communes** (Flemish **Kommen**), town, on the borders of Belgium and France; 15 miles southwest of Courtrai by rail. It is divided by the Lys into two parts: that on the left—p. 6,826—belongs to Belgium; that on the right—p. 8,575—to France.

**Comines, Philippe de la Clitède, Sieur d'Argenton** (1445-1509), French statesman and historian, was born in Renescure. He accompanied Charles VIII. to Italy, where he had a memorable interview with Machiavelli in Florence. His fame rests chiefly on his *Memoires*, which deal with the political history of Louis XI. and of Charles VIII., covering a period from 1464 to 1498. They have been translated into English by Danett. Consult Whibley's *Literary Portraits* (1904).

**Comintern**, the Third International, organized by Lenin in 1919 to carry communism to all countries. In 1943, under Stalin, the Comintern was dissolved.

**Comisco**, town, province Syracuse, Sicily. Here in ancient times was the famous fountain of Diana, the waters of which were a test of chastity in women; p. 26,137.

**Comitán**, town, state of Chiapas, Mexico, 5,300 ft. above sea level; 35 m. s.e. of San Cristobal, and 12 m. from the Guatemalan frontier. It manufactures cotton, and is noted for its brandy (*comiteco*), made from the maguey plant. It is the commercial centre of the state, having a large trade in sugar and cattle; p. 12,000.

**Comitia** ('assemblies'), formal and legal meetings of the Roman citizens, as distinct from *contiones*, which were mere mass meetings. Of such there were three, namely:

The *Comitia Curiata*, or assembly by *curia* or wards. This was the original form of assembly; but in historical times it became unimportant.

The *Comitia Centuriata*, or assembly by centuries or hundreds, instituted, it is said, by Servius Tullius. The purpose of this assembly was primarily military.

The *Comitia Tributa*, or assembly by tribes. This was the democratic assembly of Rome. It met in the Forum, and came to undertake

practically all legislation; it also elected the tribunes and minor magistrates.

In all, voting was by groups—that is, the individuals in a tribe, century, or *curia* voted, and the result was decided by the majority of tribes, centuries, or *curia*. They depended entirely on the magistrates, who convened them at their own pleasure, and entirely controlled their management, only allowing such people to speak as they invited to do so, so that there was no free discussion. Consult W. Rottford's *Roman Assemblies* (1909).

**Comity of Nations**. This expression is generally used to denote the ground on which the judicial body of one nation will recognize the laws of another nation. See *CONFLICT OF LAWS*.

**Comma**, in music, is the name given to the small interval occurring between the pitches of a note whose vibrations, calculated from the same fundamental tone, are determined by means of two different successions of *perfect* intervals. The comma most frequently used has a vibration of about 80:81. The larger or 'Pythagorean comma' has a wider interval, which amounts to about a quarter of a semitone. See *TEMPERAMENT*.

**Comma Bacillus**. See *Bacteria and Bacteriology; Cholera*.

**Commagene**, the northern-most province of ancient Syria, lying between the Euphrates, the Taurus, and the Amanus Mountains. It belonged to the kingdom of Assyria, passed under the domination of the Persians, and at the partition of the empire of Alexander the Great became a satrapy under the Seleucids. Its capital was Samosata (modern Samsat), on the Euphrates. Bronze coins of the various kings of its dynasty have lately been discovered by a German explorer, Puchstein, who has also found a beautiful tomb of Antiochus I. (69-38 B.C.) near the Nimrud Dagh. Under the Roman Empire, Commagene suffered much from the incursions of the Parthians. Finally it became subject to the Arabs, and later became subject to the Turks (Seljuk and Ottoman).

**Commandant** is not a separate rank in the U. S. Army and Navy. The officer who commands the troops at an army school, whatever his rank, is usually called the commandant; for instance, the commandant of cadets at the U. S. Military Academy, the commandant of the artillery school. Commandant is the title also of the military officers in charge of the stations of the information bureau maintained during hostilities for prisoners of war. In the U. S. Navy, commandant is the title of the officer of a navy yard or naval station. He

may be in rank a rear-admiral or a captain.

**Commandeer**, a word of Dutch origin, meaning the forcible possession of anything for military or other purposes.

**Commander**, in the U. S. Navy, is an officer who ranks below a captain and above a lieutenant-commander. The title was derived from the British navy. It was first introduced in the U. S. service by the pay bill of March 3, 1835, and was established by definite enactment three years later. A commander ranks with a lieutenant-colonel in the army, and has the same pay when on sea duty. In the Army, commander is not a rank, but the general title given to officers in charge of territorial departments, divisions, field armies, separate brigades, squadrons, artillery districts, etc.

**Commander-in-chief**, the supreme commander of the military or naval forces of a nation. In the United States, the President is the constitutional commander-in-chief of the Army and Navy, exercising his functions through the Secretary of War. As commander-in-chief the President has supreme control over territory occupied or conquered during war. In times of war he designates a commander for each army. In the U. S. Navy, the term is applied to the ranking officer at a port.

**Commander Islands**, a group of islands lying near the coast of Kamchatka, the chief of them, Bering Island, being named for the Russian commander who died here in 1741.

**Commander of the Faithful**, a title assumed by the Calif Omar I. (634-644), the father-in-law of Mohammed, and continued among the titles of his successors. See CALIF.

**Commandery**, in the Middle Ages, an estate or manor belonging to the Knights Hospitallers or the Teutonic Knights. The term is sometimes applied in modern usage to local branches of fraternal orders.

**Commanding Officer**, in the U. S. Army and Navy, is the officer in actual command of an ordinary post or troops in the field, or of a war vessel.

**Commandments, Ten.** See Decalogue.

**Commando**, first used by the Boers to signify an expedition against natives; used in World War II by the British to mean volunteers trained to raid Axis-held territory.

**Commedia**, in Italian literature, meant originally any Italian poem which had a happy ending, but later was used to indicate generally any kind of play; and more especially the comedy in the English sense of the word.

**Commelynaceæ**, an order of petaloid monocotyledons, all herbaceous, chiefly neotropical, of which a few species are cultivated

for the beauty of their flowers, notably Spiderwort.

**Commemoration**, at Oxford University, the day when degrees are annually conferred, corresponding to commencement in the United States.

**Commencement**, in the United States, the day when degrees and diplomas are annually conferred by universities, colleges, and schools. The term originated at the University of Cambridge, passed to Harvard, and thence into general use in the United States.

**Commendam** and **Commendators**. In ecclesiastical law, a vacant benefice, the spiritual duties of which were provisionally committed to the charge of an absentee, was said to be held *in commendam*. The practice is now abolished.

**Commendators** were the appointed stewards of a void benefice, nominally mere trustees, but in fact often appropriating the emoluments.

**Commendation.** See Feudalism.

**Commensalism** (literally, 'at the same table') is the name given to one of the forms of association between animals or between animals and plants. Strictly speaking, it should be applied only to those cases where two animals share the same food, and confer mutual benefit; as opposed to *parasitism* where injury is inflicted by the one organism on the other.

Among the most striking instances of commensalism are the cases of association between hermit-crabs and anemones or zoophytes. On the Atlantic Coast of Europe are found two large species of hermit crab, which live side by side in some localities. The latter species almost invariably has a brightly colored pink and white anemone placed on the back of its borrowed shell. When touched the hermit withdraws as far as possible into his shell, and the anemone at the same time discharges quantities of stinging threads through holes in its body wall. The anemone very rarely occurs except on shells inhabited by this particular hermit crab; its body is modified to fit to the shape of the shell, the mouth of the anemone coming immediately beneath the mouth of the hermit; and finally, the hermit in changing its shell removes the anemone to its new abode. The association is one of mutual benefit, the anemone obtaining food and the hermit protection. One of the American hermit crabs has as commensal a polyp. In this case a single polyp first settles upon the shell, and then buds until a colony is formed. The polyps exert a solvent action on the shell, so that this gradually disappears, leaving the



hermit enveloped in the soft polyp mass, which apparently yields to allow for the growth of the hermit.

Commensalism occurs in a great variety of animals; but many forms of commensalism may be described as stages in the acquisition of the parasitic habit. See PARASITES; SYMBIOSIS.

Consult Jordan and Kellogg's *Evolution and Animal Life* (1907).

**Commensurable.** Two quantities or numbers are commensurable which are of the same kind, and each of which contains a third quantity or number (unity excepted) a certain number of times without remainder.

**Commentary.** 1. A memoir, such as Caesar's *Commentaries* on the Gallic War. 2. An expository treatise on a technical subject, such as law. 3. Criticism of a text following the order of the text, as the various *Commentaries* on the Bible, Shakespeare, etc.

**Commerce.** See **Exports and Imports; Trade.**

**Commerce, Chambers of.** See **Chambers of Commerce.**

**Commerce Court, U. S.,** a court created by the law of June 18, 1910, to exercise jurisdiction in certain classes of cases arising under the Interstate Commerce Act, which, prior to the creation of the Commerce Court, had fallen in the jurisdiction of the circuit courts. In 1911 opposition to the Court arose in Congress; and it was abolished on Dec. 31, 1913.

**Commerce, U. S. Department of,** one of the departments of the U. S. Government whose province it is to foster, promote, and develop the foreign and domestic commerce, the mining, manufacturing, shipping, and fishery industries, and the transportation facilities of the United States. It is administered by the Secretary of Commerce, who is a member of the Cabinet.

The Department consists of these bureaus: Census; Civil Aeronautics; Coast and Geodetic Survey; Foreign and Domestic Commerce; Inland Waterways; Marine Inspection and Navigation; Patents; Standards.

**Commercial Agency.** See **Mercantile Agency.**

**Commercial Agent,** an officer stationed at a foreign port to attend to the commercial interests of the country he represents. He may have consular jurisdiction.

**Commercial Analysis.** See **Analysis, Commercial.**

**Commercial Art.** Commercial art or advertising art up to the twentieth century was essentially primitive and dealt largely with

patent medicines and package foods. Since then commercial art has taken advantage of every development in the field of art, printing, photography, and psychology. The greatest advances have been made in the monthly and weekly periodicals rather than in the newspapers. The reason for the neglect of the newspaper is due to the fact that ordinary newsprint and the rotary press of the daily take solid black tones and delicate half-tones with difficulty. The smooth paper of the better periodicals takes half-tones and colors admirably. Formerly, of course, the color was transferred from paintings. In general, commercial art kept pace with the techniques that the modernist schools introduced. Advertising pictures became suggestive rather than photographically realistic.

With the rise of instantaneous color photography, however, commercial art went back to realism. In recent years, commercial art has turned from the studio of the painter to that of the photographer. In the color advertisement realism is still the mode, but in black and white commercial photography the advertiser has abandoned realism for the new photography with its emphasis on line, light and shade, and architectural values. Indeed, the influence of architecture on commercial art is of paramount importance. It is from architecture that the commercial artist has taken his straight line effects which fit in so well with the modernistic types employed.

Bibliography: *Psychology of Advertising*, by W. D. Scott, *Gebrauchsgraphik*, December, 1936; January 1937 (Published in German and English).

**Commercial Court.** In England since 1895 commercial causes entered in the High Court may be placed in a special list to be dealt with, under a more rapid form of procedure, by a judge assigned for the purpose. This arrangement depends merely on an agreement between the judges of the King's Bench Division.

**Commercial Crises.** See **Crises, Economic.**

**Commercial Education,** as defined in the practice of the various schools which offer it in one form or another, includes all instruction designed to fit students for engaging in business. The earlier commercial schools, both in America and in Europe, undertook little more than the preparation of youths for filling clerkships. Since these crude beginnings, commercial education has been

developed to a very high degree in many of the countries, especially in Germany and Belgium, and to a noteworthy degree in the United States.

In Germany, the lower or primary commercial schools are practically continuation schools with compulsory attendance for apprentices. The Middle Schools of Commerce correspond nearly to the secondary schools of commerce of our American cities. Of the Higher Schools of Commerce before the World War, the Handelshochschule was easily foremost in the Empire. It was of true university grade and took as students not only young men and women preparing for teaching and practical work, but merchants in active business. The instruction included, besides the obvious subjects, training in the technology of the chief industries, sociology and political economy, and the study of commercial and marketing problems.

In Belgium, the Solvay School at Brussels provided a four-year course of the highest university grade including much work in the technology of industries with added instruction in colonization and colonial policy.

The more recent developments in England have been in connection with the local universities, among which the University of Birmingham had a special faculty for commercial instruction. The commercial courses in the local universities tended to be occupied with the local industries and trade relations.

In the United States, Bryant and Stratton opened their first commercial college in Cleveland, O., in 1853, and proceeded to establish other 'colleges' with local partners in some fifty cities. The course of study was gradually lengthened to two years, and the Spencerian College at Milwaukee and the Packard College in New York turned out many thousands of graduates who were well trained, considering the circumstances and the requirements of business men at that time. There were several private foundations for furnishing commercial education established in the eighties and nineties, notably the Drexel Institute in Philadelphia, and the Pratt Institute in Brooklyn, N. Y.

The movement spread to the public school system. An early trial of shorthand had been made in the Central High School in Philadelphia in 1849, and numerous short courses, which little more than duplicated the instruction of business colleges, were established in the public high schools in the eighties and nineties. In 1892 Professor Edmund J. James, then of the Wharton School, made a plea, be-

fore the American Bankers Association, for the broader training of business men. Later the same Association commissioned Professor James to prepare a report on *Education of Business Men in Europe*, which was published in 1893. This report and Professor James' numerous addresses were of great influence in broadening the conception of commercial education in the United States.

Four influences at least operated to lengthen the course of the secondary commercial school: first, comparison with other educational courses conducted by the same institutions, which were longer in extent and with a better academic basis; second, the development of higher commercial schools in America; third, the example of foreign commercial schools, with longer courses and more ambitious educational undertakings; fourth, and perhaps most important of all, the demand of business itself for those who had broader intelligence, more mature judgment, and more highly specialized skill.

Of commercial instruction given by colleges or universities in the United States, the first example was the Wharton School of Commerce and Finance, founded in 1881, as a part of the University of Pennsylvania. The four-year course at this school is elaborate and of rather advanced grade. The leading colleges now have commercial departments.

The New York University School of Commerce, Accountancy, and Finance, opened in 1900, offers a wide range of courses, most of them narrowly practical and specific, as its students are largely men engaged in some business occupation; it also conducts evening classes. The Amos Tuck School of Dartmouth College, opened in 1900, has a two-year course. Students in the college may get the bachelor's degree by substituting the first year's work in the Tuck School for the fourth-year work of the college course; while the degree of M.C.S.C. is given for the completion of the second year's work in the school.

The only strictly graduate school of commerce in the United States is the Harvard School of Business Administration, which requires the bachelor's degree for admission as candidate for its own degree. The school, founded in 1908, and greatly expanded into a large group of buildings about 20 years later, offers advanced instruction in the usual subjects, such as business and banking law, accountancy, contracts, business and commercial organization, etc. The second year of the two-year course is devoted largely to practical investigation in business establishments open-

ed to the school. Higher commercial education is also offered in a large number of colleges and universities not mentioned above.

Broadly speaking there are in the United States three types of institutions giving commercial education. 1. The first are elementary in character, covering the 7th, 8th, and 9th school years, or the junior high school. The best educational thought seems to be that commercial education in these years should be general in character and of the 'sampling' or 'try-out' variety, in order to give an all-aroundness of development to those who are not to elect commercial studies, and to furnish at the same time a sufficient background by which an intelligent election can be made for the last three years of the secondary school period.

In the 10th, 11th, and 12th school years more highly specialized commercial instruction is generally given. For a considerable time this instruction has been mainly along the lines of either bookkeeping and general office practice, or stenography, typewriting, and secretarial work. In the last few years, however, salesmanship, store service, business organization, economics, and related subjects offer a field in their entirety even larger and more promising to those who are pursuing commercial education than either of the traditional lines above mentioned.

2. The second type is the part-time or co-operative method of instruction in connection with commercial education, by which there is an alternation of attendance on school and work for wages under practical conditions. The results from this work have been so encouraging that it promises to become a prominent feature of commercial education.

3. Third and last of the forms of commercial education are the higher schools of commerce of various grades and sorts already mentioned above.

Parallel in various ways to the three types of institutions reviewed are the private business schools, of which there are hundreds in America, and a limited number of endowed institutes maintaining commercial courses. In general these courses are much more abbreviated, more highly technical, and more practical in character.

In recent years the Bureau of Education in Washington has appointed a specialist on commercial education, and the Federal Board for Vocational Education, also with headquarters in Washington, has provided for a department of commercial education with an assistant director in charge.

It should be observed in conclusion that as 'spontaneity' is the keynote of American education, so it is essentially the means of understanding the origin, growth, and present conditions of commercial education. Commercial schools were established because of a need for the instruction which they give. They have grown in response to obvious demands, and their present prosperity and wide influence result from their having recognized their field and suited their instruction to the public need.

*Bibliography.*—Consult E. J. James' *Report on Education of Business Men in Europe; Five Hundred Business Books* (American Library Association, Washington, D. C., 1919). Consult also reports and documents of Bureau of Education, Federal Board of Vocational Education, and National Society for the Promotion of Vocational Education.

**Commercial Law.** See **Law Merchant; Mercantile Law.**

**Commercial Paper.** See **Bill of Exchange; Negotiable Instruments.**

**Commercial Registers.** See **Mercantile Agency.**

**Commercial Traveller**, formerly familiarly known as a 'drummer' in the United States—is a travelling salesman sent out by a business house as its representative or agent to secure orders. Although sometimes paid in whole or part by means of a commission on his sales, he differs from a commission agent in that he does not sell or solicit orders in his own name, but in that of the firm whose representative he is.

Commercial travellers in the United States have many benevolent associations, including the Travellers' Protective Association of America, the United Commercial Travellers, and others. The Gidcons is a religious association for commercial travellers in the United States and Canada. There is also an international Federation of Commercial Men's Associations. Consult Moody's *Men Who Sell* (1907); Briggs' *Fifty Years on the Road* (1911).

**Commercial Treaties** are formal international contracts relating to trade. In general, a commercial treaty between two countries grants mutual freedom of trade in the territories concerned (including the navigation of the inland waterways), together with certain tariff privileges. An increasing proportion of modern treaties also contain a provision agreeing to submit any dispute to arbitration.

A treaty of commerce and navigation was concluded between Rome and Carthage as early as 509 B.C.; and trade agreements were

common in the Middle Ages among the Italian city republics and the Mediterranean states. The 'capitulations' concluded between Turkey and the Christian European nations granted trading privileges to subjects of the latter reading in Turkey. The treaties of commerce of the 17th and 18th centuries dealt chiefly with the treatment to be accorded the individual traders of each contracting nation in the dominions of the other. The principle of reciprocal reductions in duties was employed only to a limited extent until the 19th century, when it became the cardinal point in commercial negotiations.

The first commercial treaties entered into by the United States (18th century) made this clause conditional upon the granting of equivalent concessions; and to this conditional form American practice and interpretation have since adhered. In the early 19th century the principle of reciprocal concessions spread to the Continent of Europe. Central and South American countries have to a large extent followed the policy of reciprocity, though not without considerable variation, in their treaties with European nations. See TRADE; INTERNATIONAL TRADE; RECIPROCITY; TARIFF.

**Commers**, social gatherings of German students at which academic anniversaries are celebrated with songs, speeches, and the drinking of beer.

**Commination**, a service announcing God's judgment against sinners, which was used in the early church, and which is appointed to be read on Ash Wednesday throughout the Anglican Church. This office is one of the last memorials retained by the English Church of those public acts of penitence which were conspicuous in the primitive church. The American Prayerbook omits this office.

**Communes**. See COMINES.

**Comminuted Fracture**, in which the bone is broken into fragments. See FRACTURE.

**Commissar**, a government official, of varying ranks, especially one of the Peoples' Commissars, or heads of commissariats in the separate republics of the U. S. S. R.

**Commissariat**, a general term denoting the system by which armies are fed and supplied with daily necessities of life in peace and war. It requires the highest efficiency in the organization charged with these duties. In the U. S. Army, the duties of the commissariat devolve upon the Quartermaster Corps. See RATIONS; ARMY OF THE UNITED STATES. Consult *U. S. Army Regulations*.

**Commissary**, in the U. S. Army an officer

detailed at each post to the staff of the post commander to perform all duties relative to procuring and issuing the rations to the enlisted men, and the sale of subsistence stores as authorized by army regulations. The term is also applied to the storehouse in which rations and other supplies are kept for issue and sale. See COMMISSARIAT; RATIONS.

**Commissary**, in ecclesiastical law, is a bishop's deputy, who may be appointed to perform the bishop's duties in out-of-the-way parts of the diocese. He may be a deputy either for spiritual or for legal business. In the latter case, he may be a layman, and practically has the same powers as a chancellor of a diocese.

**Commissary General**, formerly an officer in the U. S. Army, with the rank of brigadier-general, chief of the Subsistence Department.

**Commissary Sergeant**, formerly a non-commissioned officer of the U. S. Army, chosen from sergeants serving five years and three years as non-commissioned officers.

**Commission**, in business, an allowance made for services rendered to one who acts as agent for another in the sale or purchase of goods. It is usually a percentage on the amount of money involved in the transaction.

**Commission**, in politics, is a board appointed with specified duties and limited jurisdiction. The word is often loosely used, sometimes as a synonym for committee. Commissions may be divided into international and domestic. International commissions are appointed to adjudicate a dispute or arrange an agreement with a foreign power. Domestic commissions may be appointed to investigate a subject and make a report to the creating power; or they may be created to plan and construct particular public works.

Recent years have seen a rapid development of permanent commissions, possessing administrative, legislative, and judicial powers, conferred either by Congress, the State legislature, or even by the State constitution. Civil service, labor, municipal art, and similar commissions exercise powers delegated by legislation, and their actions are subject to review by the courts. For various public commissions, see such titles as INLAND WATERWAYS COMMISSION; INTERSTATE COMMERCE COMMISSION; COMMISSION OF FINE ARTS. See also COMMISSION GOVERNMENT.

**Commission, Military**, a written certificate of rank or authority. In the United States Army it is bestowed by the President, confirmed by the Senate, and issued by the

War Department through the Adjutant General's office.

**Commission, Secret.** A secret commission may be defined as an advantage derived by an agent in the course of his employment as agent, without the knowledge of his principal, from a third person. All such advantages, whether they take the shape of money, presents, or information, belong at law to the principal and not to the agent; and the agent will be liable to account for them to the principal, even though the principal has suffered no loss in consequence of the secret commission.

In the case of public officials, secret commissions are called bribes. See **BRIBERY**.

**Commission Agent, or Commission Merchant,** a person employed to sell goods for another for a certain percentage. See **BROKER**; **COMMISSION**.

**Commissionaire,** the attendant at Continental hotels, who awaits the arrival of trains and steamboats to secure customers, and take charge of luggage.

**Commissioner,** one who has a commission or warrant from some specific authority to perform some special duty. See **COMMISSION**.

**Commissioner of Deeds.** See **Notary Public**.

**Commission Government,** a form of government which unites the executive and legislative departments of a city, and vests them exclusively in a small board of officers, elected at large by popular vote. It abolishes the ward system, puts into practice the short ballot and contradicts the time-honored doctrine of checks and balances or distribution of powers.

The comparative newness of commission government and the rapidity of its spread are indicated by the facts that it was unknown before 1901, and that by 1926 some three hundred cities of over 5,000 population, as well as several hundred smaller places, had adopted it.

In 1901, certain citizens of Galveston appealed to the Texas legislature in behalf of their city, loaded with debt by inefficient administration, and overwhelmed by the hurricane of 1900. The legislature created a commission of five members as an emergency government for the city. The immediate and remarkable success of the new government aroused interest and in 1905 it was adopted by Houston, and soon the movement became national.

The Des Moines Plan, 1907, was based on the 'Galveston Plan', and became the most widely copied form of commission government.

The salient features of commission government are, briefly, as follows: The electorate of

the city selects five commissioners to serve for terms of five years, each commissioner to have an adequate salary and to devote his entire time to the duties of his office. A petition signed by a prescribed minimum number of voters—say twenty-five—places the name of any otherwise qualified person upon the primary ballot. These names appear in simple alphabetical order without party or other description. Each voter may mark not more than five. The names of the ten persons receiving the highest number of votes at the primary, and no others, are placed on the ballot for the succeeding general and final election. From these ten the voters choose five, each one of whom necessarily receives a majority vote. A corrupt practices act minimizes the use of money at the two elections, gives publicity to its expenditure, and otherwise specifically combats unfair or degrading tactics.

The charter of the city having divided its administration into departments, each commissioner assumes the responsibility for one department.

The commissioners are vested with the broadest discretion for carrying on municipal affairs, the referendum and the recall being the city's political restraints upon their abuse of power. State audit and possibly State appointment of a civil service board may be checks from another direction. The commissioners hold open public sessions in the day time, and keep prescribed office hours every business day of the year. Individually, each administers his department; collectively, the five hold hearings and enact laws. They issue periodical statements of their transactions, financial and otherwise.

When compared with earlier forms of city government the commission plan displays some notable advantages: the voter's task is generally rendered simple; the government is easy to see, easy to understand, and easy to follow; the small size of the executive body makes possible expeditious handling of the public business; unification of powers makes it difficult to shift responsibility. On the other hand, opponents of the commission plan offer the following objections: the fusion of legislative and administrative functions in the same group of men results in eliminating the function of criticism; it completely fuses politics and administration and does not insure the election of able, trained administrators; it makes it a difficult task to build up a permanent staff of trained administrators because terms of office are short and tenure doubtful; it is a three-, five-, or seven-headed

organization with no one person completely responsible.

It may, therefore, seem fair to conclude that while the commission plan is a step forward in municipal organization, simplifying and unifying the government and making popular control more effective, it has not achieved the administrative results hoped for it, nor put the administration on a permanent and professional basis.

The latest and perhaps most popular development of the commission form of government is known as the city-manager plan. It dates from 1908. By this plan the people elect a council which has the power of supervising and directing the general affairs of the city and a salaried city manager, who is the chief executive officer, having direct charge of all administrative duties and removable by the council at any time. Since the council is usually a small body the plan is comparable to that of a business corporation.

Advantages claimed by the advocates of the city-manager plan are the complete unification of powers with a separation of functions; complete separation of the political from the administrative branch of government; the ability to choose as city manager an able and experienced executive; the means and incentive to obtain the best possible administration the city can afford. Opponents of the city-manager plan claim that it fails to provide adequate political leadership and that eventually an oligarchical administration will be the result; that in practice it does not actually separate politics from administration; that the managers chosen are often men of mediocre attainments, mere politicians who lack training and experience for the position. In conclusion it may be said that the arguments in favor seem to be more cogent than those against, and that the city-manager plan calls for more integrity and intelligence than earlier plans of organization and seems to be gaining steadily in popular favor. The plan has been adopted in a number of Canadian cities and in at least two cities of New Zealand.

**Commission Merchant.** See **Commission Agent**.

**Commission, Military**, in military law, a court for trying offenders against the laws of war. See **COURTS, MILITARY**.

**Commission of Appeals**, a court appointed in some States for a limited period, to determine appeals when the permanent court is overburdened with business.

**Commission of Fine Arts**, a permanent board, established by act of Congress in 1910,

to advise upon the location and the selection of models and of artists for monuments erected under Federal authority; and to advise generally upon questions of art at the request of the president or of any committee of Congress. By an executive order the plans for all public buildings in Washington must be submitted to the Commission.

**Commission, Public Service.** See **Public Utility Regulation**.

**Commissions, U. S. Army**, certificates of military rank and authority issued by the President of the United States, and confirmed by the Senate. In peace time all original commissions in the Regular Army, except the professional branches, *i.e.*, Medical Department, Judge Advocate General's Department, and Corps of Chaplains, are issued in the grade of second lieutenant. The National Defense Act, as amended, provides that in time of war any officer of the Regular Army may be appointed to higher temporary rank without vacating his permanent commission, such appointments in grades below that of brigadier general being made by the President alone, but all other appointments of officers in time of war shall be in the Officers' Reserve Corps. Every officer, on promotion, receives a new commission in the grade to which he is advanced. Consult *U. S. Army Regulations*.

**Commisure**, an anatomical term applied to nervous connections between adjacent parts of the nervous system. Though it is not always used in the same way, the general significance is that of a uniting bridge.

**Commitment**, an engagement. Used in speaking of the money market to signify liabilities arising in the immediate future. Thus, to say, 'Money is easy, as there are no fresh commitments,' means that loanable capital is available to borrowers at low rates because no big demands for capital are anticipated for the time being.

**Committee**, usually a selected portion of a larger body to which is committed or entrusted some particular act or course of action to be carried through, or some investigation to be performed, on behalf of the larger body; but it may also, in some important cases, be the whole body acting in a different capacity under different rules.

In the U. S. Congress, every proposed measure is referred to the appropriate committee; its details are arranged there, if the committee is disposed to urge its enactment; if the committee refuses to report the measure favorably, it is usually dropped. In the legislature of the

larger States there is an analogous committee system, with analogous functions.

**Committees of Correspondence**, committees appointed immediately before and during the American Revolution, in the various colonies and in their political subdivisions—townships, counties, cities, parishes, etc.—to represent their constituencies in various matters, and particularly to correspond and concert measures with one another. They constituted a revolutionary and revolutionizing force, whose effectiveness it is hard to overestimate. The best account of the committees of correspondence is that by Collins in the *Report of American Historical Association for 1901*.

**Committees (or Councils) of Safety**, committees appointed in the various American colonies engaged in the American Revolution, primarily to act as a sort of executive board. They served an important purpose during the interval between the deposition of the royal governors and the organization of new State governments.

**Commodore**, a courtesy title in the United States and British navies. Previous to 1862 there existed in the United States navy no grade higher than that of captain, but captains who commanded squadrons were given the courtesy title of commodore. In 1862 the grade of commodore was established by law, but in 1899 it was abolished (except for the retired list). In 1943 an action of Congress revived the rank of commodore.

**Commodus, Lucius Aurelius** (161-192 A.D.), Roman emperor, the son of Marcus Aurelius and Faustina. He was one of the most bloodthirsty and contemptible tyrants that ever disgraced a throne. Finally his mistress failing in a plot to poison him, summoned an athlete, Narcissus, to strangle him.

**Common**, in the law of real property, the right which one person has, together with others, of taking some profit from the land of another, or of the state. However, the term is also used to designate an exclusive or several right of the above character, in one or a limited number of individuals. In this latter sense it includes common of pasture, or the right of feeding beasts upon the land of another. In England, practically every village formerly had an unenclosed parcel of land, as to which no one claimed to be exclusive owner; and as to these lands the right of common was claimed and exercised by all the villagers. The name has been retained in the United States chiefly to designate parcels of land set aside by the municipality for public gatherings or for games,

and the like, for the pleasure of the community. See **EASEMENTS; REAL PROPERTY**.

**Common Carrier**. See **Carrier**.

**Commoner**, in Great Britain, any person below the rank of a peer. The term 'Great Commoner' has been applied to Lord Chatham, John Hampden, and Mr. Gladstone. At Oxford, Cambridge, and Dublin universities a 'fellow-commoner' is a student who pays the highest fees and eats his 'commons' at the fellows' table.

**Common Forms**, forms of personal actions under the common law system of pleading, under which an action could only be commenced by obtaining a *writ* from the proper court officer. Common forms were abolished in England by the Judicature acts and in most of the United States by codes of civil procedure. See **PLEADING**.

**Common Informer**. See **Informer**.

**Common Law**, as opposed to statute law, is the unwritten law of the land. Being older than statute law, it was founded on considerations of general justice, and fortified by the decisions of judges handed down from generation to generation, and binding on their successors. Thus it covers the whole range of law not specially covered by statute. It derives its certainty from the harmony of numerous decisions, and its flexibility from the ease with which doctrines can be gradually and almost imperceptibly widened or retrenched in accordance with the opinion of the age or the alteration of circumstances. Its difficulties lie in the application of a rule drawn from one set of facts to another set, in the occasional apparent conflict of decisions, and in the uncertainty of the early reports, whereas the chief difficulty of statute law arises from ambiguity of language. See **CODE; EQUITY**.

**Common Pleas**. See **Supreme Court**.

**Commons, House of**. See **Parliament**.

**Common Sense**, a term used nearly in its ordinary meaning in such an expression as 'the morality of common sense,' which signifies the morality recognized by the average upright man, as distinguished from the morality required by the speculative tenets of philosophers. But it is used in a special sense in the expression 'the philosophy of common sense,' which denotes the philosophy which bases all knowledge upon certain fundamental intuitions natural to man and universally recognized as true by the 'common sense' of mankind.

**Common Stock**. See **Stock**.

**Commonwealth**, a term sometimes used in political science as the equivalent of the Latin *respublica* (republic), but it has usually a more

limited application. Thus some of the States of the American Union are designated commonwealths, such as the Commonwealth of Massachusetts and of Virginia; and some writers on political science consistently employ the term to designate a government of the rank of such States. The term in English history is generally applied to the period between the execution of Charles I. in 1649 and the restoration of Charles II. in 1660.

**Commonwealth of Australia, The.** See **Australia.**

**Commune,** the administrative unit in France corresponding more or less to the English parish and the New England township in the country, and in urban districts to the municipality.

**Commune of Paris** (1871), a period of anarchy and blood-shed in Paris at the end of the Franco-German War, which is sometimes regarded as an outbreak of revolutionary socialism. The movement was in part political, having for its object the creation of an autonomous Paris (hence *commune*), which should be a sort of 'state within the state' of France; and also in part social and communistic, or revolutionary. It lasted from March 18 to May 28, and began with the refusal of the Paris National Guards to give up their arms, their murder of Generals Thomas and Le-comte, and their organization of themselves into a Central Committee. There was terrible fighting which reached the apex in the Red Week of May. Finally the communist prisoners were shot without trial; and on the 28th the last barricade was cleared and forced by the army under Marshal MacMahon, and the national government reestablished in Paris. March's *History of the Commune of 1871*.

**Communism,** in ecclesiastical usage either the participation in the Lord's Supper or the unity of those who partake together of this sacrament. 'Communism in one kind' denotes the practice of omitting the service of the wine to laymen.

**Communism,** a system of society sometimes called the left-wing of the socialist movement, yet the two terms refer to different though allied movements. Both schools of thought can be broadly defined as plans for the reconstruction of economic society along lines at variance with the present dominant social arrangements called Capitalism. The distinction between communism and socialism is difficult to draw and many persons use both terms quite loosely and more or less interchangeably. There are many socialists, however, who are not communists. The chief dif-

ference today is a difference in tactics rather than in aim, with perhaps more emphasis placed by the communists upon complete socialization of private property, while Socialism refers to public resources and industries. Tactically the communists claim that force is a necessary part of the transitional stage, whereas the socialists emphasize the use of pacific means. The greater prominence given to capital in the system of production since the Industrial Revolution accounts largely for differences in types of reform suggested. Disputes concerning profit and wages now lead to communistic and socialistic schemes for the common ownership of productive goods. Before the middle of the 18th century wealth was to a much greater extent in consumers' goods. We find early communists stressing equality or distribution according to need and communal living. Christianity had a strong influence on early communistic thought. In the Bible we find mention of the common ownership of goods, 'Neither was there any among them that lacked; for as many as were possessors of lands or houses sold them, and brought the prices of the things that were sold, And laid them down at the apostles' feet: and distribution was made according to need.'

Plato (427-347 B.C.) in his *Republic* suggests for the ruling classes communal living even in family relationships. Sir Thomas More (1478-1535) in his *Utopia* pictured an ideal society in which poverty and idleness would not exist, all labored according to their ability, and took the products of their efforts to a common place of distribution. Though dwellings might be individually occupied, eating and social intercourse would take place in common halls.

In the early 19th century a number of communistic settlements based on religious faith existed. In these, however, religious faith was of primary importance and communism was secondary. Of these the most important were the Shakers, largely English in origin; and the Oneida community, the members of which called themselves Perfectionists, American in origin. The Utopian socialists were also responsible for founding a number of communistic settlements in the United States in the 1st half of the 19th century. These communities had an ethical rather than religious basis. Moreover, they differed from present day communism in being isolated and non-political in character. The aim was to establish small communities from which their ideas would gradually spread. The best known communities were those founded at New Harmony,



Indiana, by Robert Owen; and those settlements inspired by the teachings of Charles Fourier, the most famous of which was probably Brook Farm. None of these communities endured for any great length of time and by 1860 the Utopian socialist movement had lost its importance.

Of the precursors of modern communism, dating from the 'scientific socialism' of Karl Marx, Francois Babeuf, 1764-1797, was one of the most important. Babeuf wished that a large national and common property should be formed immediately out of the property of corporations and public institutions. The property of individuals was to be added to this upon their death, as inheritance was to be abolished. All property would thus become nationalized in the course of fifty years. Children were to be removed at an early age and brought up together in order to train them in the principles of communism, and to prevent the growth of differences and inequalities.

Karl Marx undoubtedly influenced modern communistic thought more than any other one person. The essentials of Marxian theory were set forth in the *Communist Manifesto*, written with Frederick Engels in 1848, and *Capital*, 1867-1894. In both, we find the materialistic interpretation of history and the idea of evolution in our economic life, with an inevitable and increasing exploitation of the masses by the capitalists leading to the overthrow of the latter, form the core of Marxian thought. Economic development, in the authors' view, is characterized by increasing concentration of the accumulations of 'socially-produced capital' in the hands of a dwindling group of capitalists. Inevitably society becomes top-heavy until the revolution of the proletariat occurs, the capitalists are expropriated, the means of production pass into common ownership, and the communistic society emerges under a dictatorship of the propertyless workers who permit no economic classes to re-develop.

The proletariat will use its political supremacy to wrest, by degrees, all capital from the bourgeoisie. The means to this end are as follows: 1. Abolition of property in land and application of all rents of land to public purposes. 2. A heavy progressive or graduated income tax. 3. Abolition of all right of inheritance. 4. Confiscation of the property of all emigrants and rebels. 5. Centralization of credit in the hands of the State, by means of a national bank with State capital and an exclusive monopoly. 6. Centralization of the means of communication and transport in the

hands of the State. 7. Extension of factories and instruments of production owned by the State; the bringing into cultivation of waste lands, and the improvement of the soil generally in accordance with a common plan. 8. Equal liability of all to labor. Establishment of industrial armies, especially for agriculture. 9. Combination of agriculture with manufacturing industries; gradual abolition of the distinction between town and country, by a more equable distribution of the population over the country. 10. Free education for all children in public schools. Abolition of children's factory labor in its present form. Combination of education with industrial production, etc., etc. The period of despotic rule by the proletariat is necessary to prevent a counter-revolution by the bourgeoisie. When all have been converted there will be no need for force for there will be no opposing classes.

The 'First International' was the outgrowth of a meeting in London at which Marx spoke. This association lasted for twelve years to be followed in 1889 by the organization of another group similar in character, the 'Second International' which lasted until the outbreak of the war in 1914. At the close of the war the Second International was revived but as a socialist organization from which the communists were excluded. The 'Third International,' the communist organization which met in Moscow was of a different character as it was dominated by the Russian communists who proclaimed allegiance to the tenets of the *Communist Manifesto*. See COMINTERN.

Russia today is commonly accredited as the torch-bearer of applied communistic principles. Communist party organizations exist in other countries, but in numbers and influence these organizations do not approach the strength of the party in Russia. That country came under the control of the Bolshevik (communist) wing of the Social Democratic Party in November, 1917. In January, 1918, the Constituent Assembly was dissolved and in July the Soviet Constitution was adopted.

This was said to mark the beginning of the dictatorship of the proletariat; in reality, it was a dictatorship of the Bolshevik or Communist Party under Lenin and Trotzky. That party asserted that it had no interest outside of the welfare of the proletariat but that the wage-earners had in the past come under the influence of the bourgeois press and social conditions and hence must be educated by the communists to know what is for their own good. Thus it was necessary to bring the rank and file of the workers into line as well as to

suppress the activities of the bourgeoisie. The party organization was so arranged as to keep in power those who had shown themselves definitely in sympathy with the communist cause. The members of the local soviets elected by those communist sympathizers permitted to vote elect the members of the next higher body and so on to the All-Union Congress of Soviets.

The Bolsheviks claim they are putting into practice the theories of Marx and Engel. However, communism has not spread to other countries as was expected and foreign capital is needed for industrial development; they have been obliged to become more opportunistic and less doctrinaire in their foreign policy and to a certain extent in domestic policy. The land question has been one of the most difficult problems that the communists have had to face in order to obtain the coöperation of the largest economic group, the peasants. While the industrial workers might want socialization of agricultural production, the peasants wanted private ownership of land. The ultimate aim is to have large state-owned farms cooperatively managed and cooperatively worked. For later developments of this movement in Russia, see RUSSIA.

In other countries depression following the war gave rise to outbursts of communists. In Germany and Italy these threatened established governments, but were suppressed by nationalists under the Nazis and Fascisti, resulting in establishment of dictatorships under Hitler and Mussolini. Jan. 10, 1944, the Communist Party in the U. S. was dissolved and a Communist National Election and Political Action Committee substituted. Consult Marx and Engels', *Communist Manifesto*; Lenin's *State and Revolution*; Trotsky's *Our Revolution*, and *Whither Russia?*; Ely's *French and German Socialism*; Lenin, Bukharin, Rutgers' *The New Policies of Soviet Russia* (1921); Harry W. Laidler's *History of Socialist Thought* (1927); Normano's *The Spirit of Russian Economics* (1944).

**Commutator.** See **Dynamo**.

**Como**, a province of Lombardy, in Northern Italy, ranging over the southern foothills of the Alps, and including within its confines nearly all of Lake Como, Lake Maggiore, Lake Varese, and part of Lake Lugano. Dense forests of rare beauty are intersected by fertile plateaus. Wine, silk, corn, olives, fruits, fish and iron are among the natural resources, and silk, cotton, paper, iron, glass, hats, and lace are manufactured; p. about 456,948.

**Como** (Lat. *Comum*), city, Italy, capital of

the province of Como, situated at the southern extremity of Lake Como. The town, which still retains its rectangular plan from the time it was a military post in Julius Caesar's day, lies in a valley enclosed by sloping hills. The chief architectural features are the marble cathedral, 1386-1519, with pictures by Luini, the ancient town hall, the mediaeval building called Il Broletto, 1215, the ancient churches of San Fedel, 10th century, and Sant' Abondio, 11th century, and the ruins of the citadel of Baradello. The principal industry is the manufacture of silk. It is the birthplace of Pliny the Elder and Pliny the Younger, Volta the physicist, Pope Innocent XI., and Clement XIII.; p. 52,744.

**Como**, or **Lario, Lake**, a lake in Lombardy, in Northern Italy, at the foot of the Bernine Alps, into which its northern arm penetrates for 14 miles, dividing at Bellagio into two parts—the eastern section, called Lake Lecco, and the western, called Lake Como. Lake Como has long been famed for the beauty of its scenery. It is everywhere hemmed in by steep mountains, on the terraced sides of which are numerous beautiful villas and gardens and luxuriant groves of olives, figs, oranges, lemons, and mulberries. Pliny's ruined villa is at Bellagio.

**Comorin, Cape**, the southernmost point of the Indian peninsula.

**Comoro Islands**, group of islands belonging to France, situated to the n. of Mozambique Channel, between the northwest coast of Madagascar and the eastern coast of Africa, and including Great Comoro, Anjouan (or Johanna), Moheli or Mohilla, commercially the most important of the islands, Mayotte, and several smaller islands. The islands are of volcanic origin, and their surface is mountainous, Caratola in Great Comoro reaching 8,500 feet. The soil is fertile, producing cocoanuts, figs, oranges, sugar-cane, coffee, and vanilla. The population is estimated at about 119,000, composed of natives of Malagasy and Arab or negro origin.

**Companies, City.** The companies of the city of London originated in the guilds or crafts. There are twelve great city companies—mercers, grocers, drapers, fish-mongers, goldsmiths, skinners, merchant tailors, haberdashers, salters, ironmongers, vintners, and clothworkers—and between sixty and seventy minor companies. They have now little connection with trade; their only connection with the government of the city is that the liverymen, or higher grade of members of the companies, annually elect the lord mayor, the

sheriffs, and a few officers of the corporation, in the Court of Common Hall which is their general assembly. Consult Unwin's *The Guilds and Companies of London*.

**Company**, a term of wide significance which may include any business association from the smallest partnership to the largest corporation. It has also special applications, as in the terms Chartered Companies and City Companies.

**Company**, in military usage, a body of men under the command of a captain, usually constituting a subdivision of a regiment or a battalion. In the U. S. Army a company is the smallest administrative unit in different branches of the service.

**Company, John**, a nickname for the English East India Company.

**Comparetti, Domenico Pietro Antonio** (1835-1927), Italian philologist. His masterpiece is the *Virgilio nel medio evo*, one of the most fascinating among erudite works. See English Trans. by Benecke, 1895.

**Compartmento**, the name for each of the sixteen great territorial divisions of Italy, under which the provinces are grouped.

**Compass**, an instrument used for directing a course. The action of the magnetic compass depends upon the attraction of the earth's magnetic force. The earth is a great magnet, with one pole in the neighborhood of  $70^{\circ}$  N. lat. and  $95^{\circ}$  W. long., and the other near  $72^{\circ}$  S. lat. and  $155^{\circ}$  E. long. These poles are not points, but areas over which the vertical intensity of the magnetic force is practically the same; within these areas a freely suspended magnet hangs nearly or exactly vertical.

As we recede from the magnetic poles, freely suspended magnets change from a vertical position until, on the magnetic equator (which is nowhere more than  $15^{\circ}$  from the geographic equator) they are horizontal. A magnet which is constrained to move only in a horizontal plane will point nearly toward the magnetic pole. Its direction in different parts of the world has been carefully ascertained and tabulated; so that if we know the magnetic direction of the ship's course, we can ascertain the true geographical direction by applying corrections due to variation or declination, or deviation. *Variation* or *Declination* is the angle between magnetic north and true north.

Steel ships are large magnets, and even wooden ships have enough iron or steel in them to affect the compass. The magnetization on the ship causes the compass to deviate from magnetic north by a certain amount, called the *Deviation*, and this is different for

every change in the heading of the ship. In most ships it is convenient to 'compensate' for the deviation by means of magnets and soft iron correctors. These are so placed near the compass as to almost exactly counteract the ship's magnetism and reduce the deviation to zero. Compensation is never quite perfect, however, and the operation must be repeated and the magnets readjusted if the ship greatly changes her magnetic latitude because the earth's magnetic force changes as we recede from the poles, while the magnets do not.

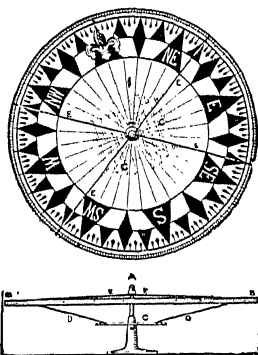


FIG. 1.—Lord Kelvin's Compass

A. Aluminum boss connected with aluminum rim B. by silk cords E. The eight small magnets C are suspended from the rim by cords D.

The early history of the magnetic compass is unknown. Many writers have stated that it was known to the Chinese before the Christian era. As mounted on board ship, magnetic compasses are of two kinds, dry and liquid. The most common form of the dry compass is that devised by Lord Kelvin (see illustration). In the *Liquid Compass* the needles are carried by a buoyant frame in a non-freezing liquid (alcohol and water). These are used in some battleships as they are stable under gunfire.

A compass card is divided into 32 points, which are subdivided into quarters; it is also divided into 360 degrees. The points are: north, north by east, north northeast, northeast by north, northeast, northeast by east, east northeast, east by north, east, east by south, east southeast, southeast by east, southeast, southeast by south, south southeast, south by east, south, south by west, and so on for the other two quadrants.

The gyroscopic compass design is founded upon Newton's first law. From this we see that

the axis of a freely suspended gyro wheel will tend to turn parallel to the earth's axis of rotation, so that its spin will be in the same direction as that of the earth. The axis of the wheel being pointed to the north, when working under proper adjustment, it is only necessary to attach a compass card and we have a compass which always shows the true north. This obviates some of the adjusting due to 'total error'—variation and deviation.

For modern battleships and vessels carrying iron ore, machinery, railway rails and similar cargo, such a compass is almost indispensable.

The latest members of the compass family are the aircraft compasses, among them the 'sun compass.' In flying the errors are greatly complicated and problems are still to be solved. See BINNACLE; GYROSCOPE; MAGNETISM; NAVIGATION. Consult Evans' *Admiralty Manual for the Deviation of the Compass*; Bowditch's *American Practical Navigator*; Muir's *Navigation and Compass Deviation*; Laning's *Practical Manual of the Compass*.

**Compasses**, instruments for transferring and marking off distances, or for drawing circles, or arcs. The common compasses are simply two rods or 'legs' joined at one end by a pivot joint, and pointed at the other. *Beam Compasses* consist of points sliding on a long bar, to which they may be clamped. They are used for greater openings than pivot compasses can safely span. *Proportional Compasses* have a point at each end of each leg and the pivot between. They are very useful in making reduced or enlarged copies of drawings. *Triangular Compasses* have three legs, so that the points of a triangle may be all transferred at once. For *Caliper Compasses*, see CALIPERS.

**Compensation**, as a legal term, always suggests the idea of balancing one thing against another. In Roman law and systems derived therefrom it means exactly what in Anglo-American law is called 'set off'—that is, the wiping out of a claim by means of a counterclaim. In the United States and Great Britain the word now generally denotes an equitable or statutory claim which one party has against another for loss arising either to property or person. Recent legislation has provided that workmen injured in the course of their employment shall receive compensation from their employers.

**Compensation, Workmen's.** See **Employers' Liability**.

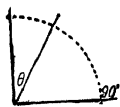
**Competition**, in economics, exists wherever one person contests with another for the advantage derivable from dealing with a third party, and may be defined as the unrestrained

action of individual self-interest. Socialism denounces the evils and wastes of competition, rejecting it as a social ideal in favor of common regulation according to principles of ideal distribution. The chief argument in favor of competition is that free competition has been attended with progress, and has acted as a powerful stimulus to human energy. But the development of the system has brought special safeguards against the evils of competition, notably trades unions. In the United States especially, the development of the trusts has tended to make competition a dead letter. See ECONOMICS; LABOR LEGISLATION; MONOPOLIES.

**Compiègne**, town, department Oise, France. The most interesting building is the Castle, built by Louis XV., and used as a royal residence by Napoleon I., and again by Napoleon III.; it is now a museum of antiquities. There is also a fine Hôtel de Ville. A statue was erected in 1880 to Joan of Arc, who was captured here in 1430. The extensive and beautiful forest of Compiègne was a favorite royal hunting ground; p. about 17,046.

**Complaint** (legal). 1. The formal allegation that an offence has been committed. 2. The written statement of the plaintiff's case.

**Complement** of an angle is what it lacks to make up 90°; of an arc, to make up a quadrant; and hence the complement of a star is its zenith distance. In music, two intervals, which together make up an octave, are complementary. In arithmetic, the difference between any number and the next higher power of ten. For complementary colors, see COLOR.



Complement of an  
Angle and of an  
Arc.

**Complement** (nautical), the full number of men that should be on board a ship to navigate and fight her.

**Complex Number and Imaginary Quantity.** The solution of the equation  $x^2 + 1$  consists of the real positive and negative units  $+1$  and  $-1$ . The equation  $x^2 = -1$  admits of no 'real' solution, for the square of any real quantity, rational or irrational, is positive. To complete the system of numbers, mathematicians introduce the imaginary unit  $i$ , imaginary so far as real positive and negative numbers are concerned, and stipulate that it shall

be subject to the laws of algebra by the principle of permanence. There thus arise the purely *imaginary* quantity,  $ai$  and the *complex* quantity  $b + ci$ , where  $a, b, c$ , are real.

The complex number is illustrated geometrically by the Argand diagram, a mode of representation first used, however, by Gaspar Wessel, 1797. The theory of functions of a complex variable forms one of the most important branches of the theory of functions.

In analytical geometry a line is said to cut a curve in imaginary points when the equations for the co-ordinates of the intersection of line and curve have imaginary or complex roots. Consult A. R. Forsyth's *Functions of a Complex Variable*.

**Compline** is the last of the seven canonical hours in the Roman Catholic breviary.

**Composing Machines.** See **Typesetting Machines**.

**Compositæ**, or compound flowers, form the largest of all the botanical orders. This order is also the most widely distributed through all regions of the globe, although most abundant in temperate and subtropical climates; and, furthermore, the richest in individuals, it having been reckoned that about every tenth plant on the earth's surface is a composite. In all of them the 'flowers' are really heads or capitula, composed of a number of florets densely packed together, the heads being each surrounded by an involucre of bracts. The calyx is superior, the corolla gamopetalous, the five stamens syngenesious (*i.e.*, united by their anthers), and the style single.

Although none attain the highest economic importance, the artichoke and Jerusalem artichoke, salsify, lettuce, endive, etc., are familiar inmates of the kitchen garden. Other members of the order are the sunflower, dahlia, thistle, wormwood, southernwood, dandelion, cardoon, tarragon, and camomile.

**Composite Order.** See **Architecture**.

**Composite Portraits.** See **Portraits**, **Composite**.

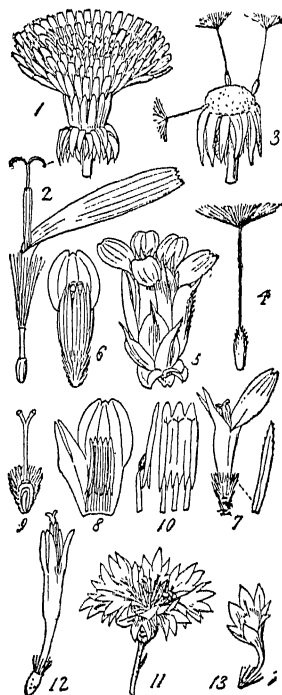
**Composition in Printing.** See **Printing**; **Typesetting Machines**.

**Composition (legal)** denotes any settlement of a dispute between two parties, or any arrangement as to the liability of the one to the other.

**Composition of Forces.** Under the title composition of velocity and forces we deal with one of the fundamental problems in mechanics. If a point is moving with two independent velocities in any direction, it moves in some one definite *direction* with a definite

*speed*. This single velocity is equivalent to the two *component* velocities, and is termed their *resultant*.

When the two components are in the same straight line, their resultant is equal to their algebraic sum. In the case of velocities in different directions, the magnitude and direction



*Types of Compositæ.*

1, Capitulum of dandelion; 2, floret; 3, receptacle with fruits adhering; 4, single fruit; 5, capitulum of nassauvia; 6, flower; 7, flower, palæ removed; 8, corolla and androecium opened; 9, fruit; 10, stamens; 11, capitulum of cornflower; 12, floret; 13, neuter floret.

of their resultant are obtained by the following theorem, known as the *Parallelogram of Velocities*: If a point A move with two velocities, represented in magnitude and direction by AP and AQ respectively, their resultant will be similarly represented by AR, the diagonal of the parallelogram of which AP and AQ are continuous sides. Similarly, we may compound any number of velocities in one plane into a single resultant. All that has been said of

velocities applies equally well to forces. See DYNAMICS; KINEMATICS; STATICS.

**Compos Mentis.** See **Insanity**.

**Composts** are a kind of manure consisting of mixtures of substances adapted to the fertilization of the soil, allowed to ferment for a considerable time in heaps, become more valuable than they were at first. Road scrapings, peat moss and leaves form materials for the purpose. By allowing these to lie for six months in heaps of from 3 to 4 feet in depth, food is prepared for plants.

**Compound** is the usual name in India for the enclosure in which a house stands.

**Compound Dislocation.** See **Dislocation**.

**Compound Engine.** See **Steam-engine**.

**Compound Fracture.** See **Fracture**.

**Compounding of Felony** is the offence committed by a person who, having been injured through the commission of a felony, agrees for a valuable consideration not to bring the felon to justice.

**Compound Interest.** See **Interest**.

**Compound Microscope.** See **Microscope**.

**Compounds**, in Chemistry, are a class of substances formed by the union of two or more elements, and recognized by the following features: 1. The components of a compound cannot be separated by taking advantage of the differences in their properties unless they are first set free from each other by the action of such agencies as heat or the passage of electric currents; 2. the components unite only in fixed proportions; 3. the properties of a compound are not intermediate between those of its components, but are usually quite different.

**Comprador**, Portuguese word, usually signifying Chinamen in Hong-kong and the treaty ports who act as agents of foreign business houses in dealings with natives.

**Compress**, in medical language, is a bandage. Compresses are of two kinds—*cooling*, consisting of some wetted material left exposed for evaporation; and *heating*. Poultices of hot bread, etc., serve as heating compresses.

**Compressed-Air Motors and Air Compressors.**—While the use of air under pressure to do certain work has been described in ancient works like Hero's *Pneumatics* (200 B.C.), the modern use of true compressed air is generally conceded to have had its commercial beginning with the air drills employed in the Mont Cenis tunnel (1861). The use of compressed air as a motive power for machines is

closely allied to that of steam. In practice, however, compressed air has great advantages for the driving of certain forms of machinery, chief among these advantages being its adaptability to transmission, with no loss of power from radiation, and, in underground work, the fact that the discharge is a healthful instead of a noxious addition to the atmosphere.

In compressing air, the temperature rises with the forced decrease in volume and the resulting increase in pressure. Maximum efficiency of compression is secured if the temperature of the air remains constant; and this is the widely adopted commercial plan known as *isothermal compression*, though attained only more or less imperfectly.

The most general application of compressed air, however, is to the class of small machines which require to be easily moved, handled, and controlled, or in which a rapid succession of blows may be delivered with effect. Among these may be mentioned rock drills, coal cutters, riveting hammers. See PNEUMATIC APPLIANCES. In drills the compressed air is supplied through a long flexible tube, and admitted into a small cylinder, just behind the piston which drives the tool. At half stroke a valve automatically cuts off the supply, and, just before the end of the stroke, admits air in front of the piston, cushioning it against shock, and driving it back into position for another stroke. The waste air, which escapes through an outlet valve, is considerably reduced in temperature and serves to keep cool the cutting or striking head. Steam-driven air compressors in ordinary use may be classed as follows:

(a) Straight-line type, in which a single horizontal air cylinder is set tandem with its steam cylinder, and provided with two flywheels. This pattern is generally adapted for compressors of small size.

(b) Duplex type, in which there are two steam cylinders, each driving an air cylinder, and coupled at 90° to a crank shaft carrying a flywheel.

(c) Horizontal, cross-compound engines, each steam cylinder set tandem with an air cylinder, as in (b).

(d) Vertical, simple, or compound engines, with the air cylinders set above the steam cylinders.

(e) Compound or stage compressors, in which the air cylinders themselves are compounded. The compression is carried to a certain point in one cylinder, and successively raised and finally completed to the desired



*Riveting by Compressed Air.*

pressure in the others. They may be either of the straight-line or duplex form, with simple or compound steam cylinders.

(f) Rotary compressors, in theory and design much like centrifugal water pumps; driven by steam turbines.

Both the steam turbine and the rotary compressor have increased efficiency at very high speeds, and they are natural companion machines.

Air can be compressed directly by falling water. Good efficiency is secured by the absence of mechanical friction. Use of compressed air is important in automatic brakes and for frozen meat chambers. See PNEUMATIC APPLIANCES.

**Compression and Compressibility.** When a body is subjected to the action of any force which causes it to occupy less volume, it is said to be compressed, and the diminution of volume is termed *compression*. *Compressibility* is the ratio of the amount of compression per unit volume to the compressing force applied. The unit of pressure generally used is *one atmosphere*. Its actual value in pounds-weight per square inch is nearly 14.7. Under a pressure of 100 atmospheres, air will be compressed to one-hundredth of its original volume, and the average compressibility (if the temperature be kept constant) is measured by the number which measures the final pressure—*viz.*, 100. The measurement of the compressibility of liquids is usually made in a glass vessel termed a piezometer. For igniting oil, by gas-oil compression, the Diesel engine uses the greatest pressures, to 480 lb. per sq. in.; temperature, 1,000°.

**Compromise Measures of 1850**, variously known as the **Omnibus Bill**, a series of measures passed by Congress during 1850, the chief points of which were the admission from time to time of the new States formed in Texas, the immediate admission of California with the boundaries proposed, and the Territorial organization of Utah and New Mexico without the Wilmot Proviso. What, however, proved to be the real question at issue was contained in clauses enacting the return of fugitive slaves escaping into the free States, and the total abolition of the slave trade in the District of Columbia, under heavy penalties. These resolutions were laid (April 18) before a Committee of Thirteen of which Clay was chairman, and on May 8 he reported from it two bills, for the abolition of the slave trade in the District of Columbia and for the settlement of the principal pending controversies. The latter was known as the 'Omnibus Bill.' The introduc-

tion of these bills gave rise to one of the most famous debates in Congress, Clay, Webster, Calhoun, Benton, Seward and Chase taking part. The sections were eventually passed as separate acts, collectively known as the 'Compromise Measures of 1850.' Yet neither side was satisfied, the North being angered by the Fugitive Slave Law, and soon the whole slavery question was re-opened in 1854 by the Kansas-Nebraska Bill.

**Compton, Arthur Holly** (1892- ), American physicist. Professor at University of Chicago (1923-45); instructor and lecturer here and abroad at other universities; known chiefly for work on X-ray and electrons, and honored by numerous scientific bodies. He was Chancellor Washington Univ. (1945- ).

**Compton, Karl Taylor** (1887- ), American physicist, brother of the above. President of the Massachusetts Institute of Technology from 1930.

**Comptroller, or Controller**, an officer whose duty is to check accounts by keeping counterrolls or counterfoils; hence a steward or treasurer. The Comptroller of the Currency has for his chief function the supervision of the national banking system.

**Compurgation**, an ancient legal term denoting a method of proof of the innocence of a defendant by the oaths of a certain number of persons acquainted with him. Compurgation was finally abolished 1833.

**Comstock, Ada Louise** (1876- ), American educator. In 1912-23 she was dean at Smith College and 1923-43 president of Radcliffe College.

**Comstock, Anthony** (1844-1915), American reformer, chief special agent of the New York Society for the Suppression of Vice.

**Comstock, George Cary** (1855-1934). American astronomer. He was an organizer of the American Astronomical Society and served as its president in 1925-8. He wrote numerous volumes and was a member of many learned societies.

**Comstock, John Henry** (1849-1931), American entomologist. Besides his government reports and numerous contributions to scientific periodicals, he published *Introduction to Entomology*, and other works.

**Comstock, Theodore Bryant** (1849-1915), American geologist. In 1893-5 he was president of the University of Arizona. He also filled State positions as geologist, and was consulting mining engineer for several large companies. He published *Outline of General Geology* and many scientific papers.

**Comstock Lode**, a remarkable ore-deposit



in western Nevada on the eastern slope of the Virginia Range, an offshoot of the Sierra Nevada. It was discovered in 1859. The yield now is much smaller than formerly. At a cost of more than \$2,000,000 the Sutro Tunnel was constructed through the mountain to drain the mines.

The lode occurs in igneous rock walls. Its origin has been the subject of much discussion. A complete and entertaining description is given by Eliot Lord, *Comstock Mining and Miners*, U. S. Geological Survey, and a scientific discussion by Geo. F. Becker, *Geology of the Comstock Lode*, U. S. Geological Survey.

**Comte, Isidore Marie Auguste François Xavier**, generally known as **Auguste** (1798-1857), French positivist philosopher. After the completion of his *Positive Philosophy*, Comte formed the Positivist Society, the aim of which was to undertake the reorganization and direction of society—for this he wrote the *Catechism positiviste*, in which are detailed the creed, ritual, and ceremonial of the new religion of humanity. Since the reformation, according to Comte, humanity has been given over to anarchy. Men's conceptions are intellectually incoherent, and consequently their actions are morally unstable. He believes that a careful study of the laws of the universe and of human nature would reveal the fundamental laws of progress; and these truths properly systematized would form a creed, a philosophy, a religion. Consult J. S. Mill's *Auguste Comte and Positivism*; Herbert Spencer's *Reasons for Dissenting from the Philosophy of Comte*.

**Comus**, the god of festal mirth, represented as a winged youth.

**Comyn, Cumming, or Cumyn**, a family originating in the French town of Comines, who became powerful in Scotland. In a blood feud Bruce was victorious and the Comyn family was crushed.

**Conant, James Bryant** (1893- ), American research chemist, born in Dorchester, Mass. Author of books on chemistry, Major, Chemical Warfare Service, 1918. President of Harvard University since 1933. Dr. Conant has proved to be an ardent advocate of freedom of speech and liberalism in education. Among other things he has turned down a Nazi offer of a scholarship, and he was one of the chief protestants against a Massachusetts law requiring teachers to swear allegiance to the Federal and State Constitutions. As president of Harvard University he has inaugurated many

reforms, notably the creation of national scholarships and roving professorships. He has received honorary degrees from various universities. In 1941 he visited England as a representative of President Roosevelt.

**Conant, Thomas Jefferson** (1802-91), American Hebrew and Biblical scholar. He was reviser of the common English version of the Bible for the American Bible Union.

**Concealment**, a legal term. It covers the improper suppression of facts, or hiding of person, crime, or property.

**Concepción**, town, Argentine Republic; good trade in wheat, cattle, wool, timber; p. 10,000.

**Concepción**, province, Chile, lying between the Argentine Republic and the Pacific. There are extensive forests and coal deposits; an excellent wine is made; p. 247,611.

**Concepción**, town, Chile, capital of the province of Concepción; the independence of Chile was declared here; p. 70,645.

**Concepción**, or **Villa Concepción**, city, Paraguay. It is the chief commercial centre for the export of maté; p. 15,000.

**Concepción**, town, Luzon, Philippine Islands; produces rice, sugar, tobacco; p. 17,487.

**Concepción de la Vega**, town, Santo Domingo, capital of the province of La Vega; successor to an old town founded by Bartholomew Columbus in 1495. Desultory excavations have revealed many small objects, and there are remains of foundation walls and towers; p. 10,000.

**Concept and Conceptualism**. A concept is an idea which has been formed by thought and permanently embodied in language. To the concept of a particular thing this particular thing itself is the object corresponding in reality; but is there a general thing, so to speak, corresponding in reality to the general concepts? The doctrine of *conceptualism*, which is specially connected with the name of Abélard, sought to mediate between *realism* and *nominalism*: proclaiming an objective resemblance of nature in things.

**Conception**, in human physiology, the impregnation of the ovum.

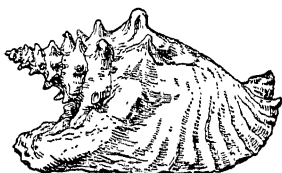
**Concertina**, a portable musical instrument, invented by Sir Charles Wheatstone in 1829. The sound is produced by expandible bellows, operating on free metallic reeds.

**Concerto**, a musical composition, generally designed for a solo instrument—usually the piano or violin—with an orchestral accompaniment. The creator of the concerto was Giuseppe Torelli, 1686; but the form was de-

veloped by Bach, and others. It consists of three movements, its form resembling that of the sonata, upon which it is founded.

**Concert of Europe**, international control on the part of Great Britain, Russia, Austria, and Prussia established at the Congress of Vienna in 1815. The year 1822 saw its break-up when Great Britain withdrew from the congress.

**Conch**, the name given to various carrion-feeding molluscs found on reefs in tropical seas. They belong to the family Strombidæ and have heavy, thick shells with a conical spire. The shells are used in the manufacture of cameo.



*Conch (Strombus gigas).*

**Conchoid**, a curve invented by Nicomedes for solving the famous problem of the ancients, the duplication of the cube. It may also be used to trisect an angle.

**Conchology**, a branch of zoölogy dealing with molluscs.

**Conciergerie**, a famous prison in Paris occupying the lower floor of the north wing of the Palais de Justice. Marie Antoinette, Robespierre, and others passed their last days here.

**Conciliation, International.** See **Arbitration, International.**

**Conciliation Boards.** See **Arbitration, Industrial.**

**Conclave**, an apartment in the Vatican in which the cardinals, who are to elect a new Pope, are housed until the election is completed. The cardinals occupy this apartment on the eleventh day after the death of a Pope and may not leave it until the new Pope is named. The term conclave is also applied to the body of cardinals so assembled.

**Concord**, in music, is a combination of notes satisfying in itself.

**Concord**, town, Massachusetts, Middlesex co. It is famous both as a literary shrine and for its patriotic associations. The rude wooden bridge spanning the river, now replaced by a cement structure, was the scene of the first battle of the American Revolution, April 19, 1775. The homes of Emerson, the Alcotts, Thoreau, and Hawthorne are preserved; and

here, in Sleepy Hollow Cemetery, are their graves; p. 7,972.

**Concord**, city and capital of New Hampshire. It has handsome buildings, among them St. Paul's School. Among memorials are the Hannah Dustin Monument, the Bradley Monument in memory of Samuel Bradley and others massacred by the Indians, Aug. 11, 1746. Granite quarrying is an important industry and there are flourishing manufactures and a large printing plant, the Rumford Press. Concord was known as Pennacook, until 1733, and as Rumford until 1763. It became the capital of the State in 1816; p. 27,171.

**Concord**, city, North Carolina, county seat of Cabarrus co.; seat of Scotia Seminary for colored students. Industries include cotton mills; p. 15,572.

**Concordance**, a dictionary or index of the Bible, in which the leading words are listed alphabetically, giving the book, chapter, and verse in which each is to be found; also a similar index to any other work or collection of works, as the plays of Shakespeare or the writings of Chaucer. The compiler of the first concordance was probably Cardinal Hugo de St. Caro, who about 1230 completed at Paris 'a short concordance' of the Vulgate. Famous Concordances include Alexander Cruden's and Robert Young's of the Bible; Bartlett's of Shakespeare.

**Concordat**, the name given in French history to arrangements made between the monarchy and the papacy for defining and determining the duties and rights of the clergy with respect to these two powers respectively. Of such arrangements there have been two specially notable. In 1516, Francis I. met Pope Leo X. at Bologna, and drew up the first concordat. This concordat governed the relation of France to the papacy down to the revolution, when it was superseded by the civil organization of the clergy by the Constituent Assembly in July, 1790. But a new concordat was made between Napoleon and Pius VII. in the year 1801. In 1904, consequent on the suppression of teaching by the religious orders and the dismissal of a bishop by Cardinal Vannutelli, friction arose between the Vatican and the French government. A movement was set on foot to separate church and state, and the concordat was abrogated in the latter part of 1905. See De Pradt's *Les Quatres Concordats* (3 vols. 1818-20); Dupin's *Manuel de Droit Ecclesiastique Français* (1860); and D'Haussonville's *L'Eglise Romaine et le Premier Empire* (1868-70).

**Concrete.** An artificial stone formed by

mixing cement, which will harden in the presence of water, with an aggregate composed of sand or crushed stone of a similar fineness, and stone, or a similar hard, inert material of larger size. Owing to the fact that it is a plastic material, changing from an original semi-fluid to a hard, compact substance, it can be molded into any desired shape.

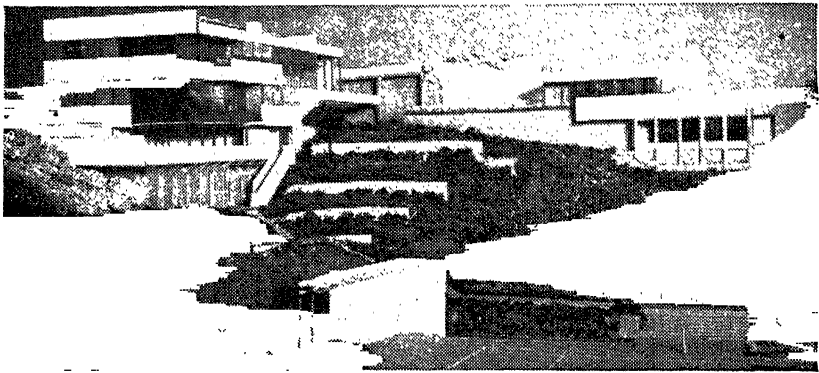
While it has been used as a building material since the earliest times, with a crude sort of cement as a binder, it is within the last quarter-century that its growth has been most marked, particularly since the invention of 'reinforced concrete,' a combination of steel and concrete in which the concrete is utilized to resist the compressive stresses, and the steel the tensile stresses.

by turning with a shovel, then adding the water and making a mortar, and finally adding the stone, turning the whole over and over until the stone is incorporated in the mass.

Proper design and construction are among the most important features of concrete work. Forms for holding the concrete till it hardens, the proper 'pouring' methods, the mixing, all have a part in preventing collapse or bending.

Its broadest use is in building construction. Of late years liquid concrete has been poured between two sets of cast-iron molds made in separate units and bolted together. A whole house may be poured in a few days and ready for occupancy when hardened.

As a decorative material, concrete is being used quite extensively, though this is a com-



*Modern All-Concrete House.*

Portland cement is used in about 94% of the concrete construction in this country. This is an artificial cement produced by the calcination and subsequent pulverization of a proportioned mixture of carbonate of lime and clay or slag. It is made in a number of mills in various parts of the country, and is sold in sacks or barrels. As cement hardens upon application of water, in storing care must be taken to keep away all moisture.

The other ingredients of concrete are known as 'fine aggregate' and 'coarse aggregate' respectively. Fine aggregate consists of sand, crushed stone, or gravel screenings which will pass through a small screen—say, one having four meshes to the linear inch. Coarse aggregate may be either gravel or broken stone.

Concrete is mixed by hand or by machine, most generally the latter. In some work, where economy will not warrant a power mixer, the mixing is done on a board platform by first thoroughly mixing the sand and cement dry

paratively new development; it lends itself very effectively to ornaments such as garden benches. Concrete possesses marked fireproof qualities. Experiments have shown it to have a low conductivity, so that heat takes a very long time to reach the body of the mass and to cause expansion. Well-made, dense concrete is practically water-tight, but poorly made concrete shows a tendency to leak under water pressure.

Wear-resisting qualities make concrete of importance in road construction. See CEMENT; Buel and Hill's *Reinforced-Concrete Construction*; Taylor and Thompson's *A Treatise on Concrete*; O. Faber and H. L. Childe's *The Concrete Yearbook*.

**Concretion**, a term applied in medicine to any abnormal solid or semi-solid mass formed in the human body from any of the natural secretions—as gallstone.

**Concretions**, in the sense in which that term is used by the geologist, are masses of

rounded or irregular form which occur in sedimentary rocks, more particularly in sandstones, shales, clays, and impure limestones. A classification of concretions based upon origin and structure is given by J. E. Todd, *Concretions and their Geological Effects*, Bull. Geol. Soc. of America.

**Concubinage** marks a stage in the development of the institution of marriage towards definite and consistent monogamy. It was recognized by law as at least a permissible practice, but it was of inferior sanctity and bindingness as compared with regular marriage. However, when the regular marriage had yielded no heir, concubinage was not only permissible but laudable under the patriarchal or family religion of classical times. Augustus, to check licentiousness and to promote stability in the marriage relation, forbade or at least materially restricted it by legally degrading the position of a concubine by the *Lex Julia*. The practice continued, however, and concubinage as a legal institution was not abolished in Germany, for instance, till 1577. Compare also MORGANATIC MARRIAGE.

**Concussion of the Brain**, the stunning effect produced on the brain by a fall or a blow. The immediate result is stupor.

**Condé, Henry I. de Bourbon, Duc d'Enghien, Prince de** (1552-88), son of Louis I., took part with his cousin, Henry of Navarre, afterward Henry IV. of France, at the battle of Arnay-le-Duc. After the massacre of St. Bartholomew, in order to save his life, he temporarily became a Roman Catholic. He took a prominent part in the subsequent religious wars as a Protestant.

**Condé, Henry II. de Bourbon, Duc d'Enghien, Prince de** (1588-1646), posthumous son of Henry I., was brought up in the Roman Catholic faith. His ambition and intrigues disturbed the first years of Louis XIII.'s minority, until finally the regency imprisoned him in the Bastille. After his liberation he became a docile instrument of Richelieu.

**Condé, Louis I. de Bourbon, Prince de** (1530-69), was the first of his line to assume the title of Condé. He was a staunch supporter of the Huguenots, took part in the conspiracy of Amboise, and again in a second revolt against Catherine de' Medici. Catherine's subsequent attempt to seize Condé and Coligny led to their flight, and to Condé's death at the battle of Jarnac.

**Condé, Louis II. de Bourbon, Prince de** (1621-86), 'the Great Condé,' at an early age gave signs of the quick intellect, extraordinary courage, excessive haughtiness, and hardness

of heart which afterward distinguished him. His influence was immensely strengthened by his victories over the Spaniards. He supported the court against the Fronde, until his attitude towards Mazarin and Anne led to his imprisonment; however the union of the Old and New Frondes led to his release. Appointed to command in the Low Countries, he won the battle of Lens. An indecisive attempt on Paris was followed by flight when he entered the service of Spain, and commanded the Spanish armies until his defeat before Dunkirk, 1658. Restored to his rank in France he subsequently fought the Dutch.

**Condé, Louis Joseph de Bourbon, Prince de** (1736-1818), son of the Duke de Bourbon, fought with distinction in the Seven Years' War, winning the battle of Johannisberg. He afterward commanded the 'army of Condé' against the revolutionists. He retired to England but returned to France at the Bourbon restoration. He is the author of *Essai sur la vie du grand Condé*.

**Condenser**, an apparatus for changing a vapor, such as steam, into its liquid by removing the latent heat. In the case of the steam the primary object for the condenser is to speedily remove the steam as fast as it passes through the engine or turbine and by its condensation so reduce the volume of the substance that a low pressure exists at the engine outlet, thereby decreasing the pressures against which the engine's piston must work.

The *jet-type condenser* was extensively used up to a few years ago in many power plants. With the advent of motor drive for power-plant auxiliaries, the steam driven pump and jet condenser was largely superseded by the motor-driven pump and *low-level condenser*.

In still another low-level jet condenser both the air and water are removed by the kinetic action of the steam. These are called *syphon condensers*. The condenser has a set of rings making up a Venturi-shaped passage to the lower end of which is attached a tail pipe. Water enters through a water box containing a set of nozzles in its lower side. The steam enters at the top and, flowing in through the rings making up the Venturi passage, meets the high-velocity water jets and is immediately condensed.

It is obvious that there is always danger of flooding the engine or turbine if the pump should fail and the relief, or vacuum breaker, fail to operate. As is well known, the atmospheric pressure will support a column of water 34 ft. high if there be a total vacuum or absence of pressure, above the column. If a pipe

be elevated 34 ft. high, the process of condensing the steam could be carried on in the condenser head and the water permitted to drop through the pipe without danger of flooding the engine. This is the principle of the *barometric condenser*.

In the majority of power plants the water supply carries scale-forming material, and as the condensed steam is free from such foreign matter, every effort is made to save it for reuse. For this reason the jet and barometric condensers have been replaced by the *surface condenser*. Steam from the turbine or engine enters the shell when it is condensed by water flowing through the tubes. The condensed steam, or condensate, flows into a chamber at the lower side of the shell from whence it is removed and returned to the boiler feed-water supply by the condensate pump.

The tubes are usually of brass but Admiralty metal, an alloy of 70 per cent. copper, 29 per cent. zinc and 1 per cent. tin, is becoming the most popular metal. With a well-designed condenser the vacuum obtained should approach within 0.5 inches of water, of the absolute zero pressure, or 30 inches of vacuum.

In first cost the barometric and the low-level jet condenser are much cheaper than the surface condenser. The former types are cheaper to operate, require less attention and when the cooling water is free from scale-forming material they are to be preferred. But as most waters are scale-forming the surface type is the most widely used.

Condensers are used in ammonia plants and in gas-making practice. These include atmospheric condensers, which have the exteriors of the tubes through which the gas passes cooled by air, and water condensers supplied with a flow of water surrounding the gas tubes. These cool the gas to remove substances which are not permanent gases at normal temperatures. Other manufactures using condensing apparatus are those of petroleum and perfumes.

Consult Fernald and Orrok's *Engineering of Power Plants*; Croft's *Steam Power Plant Auxiliaries*; Gebhardt's *Power Plant Engineering*; Morrison's *Practical Refrigeration*.

**Condenser**, a form of electrical apparatus used to accumulate a charge of electricity. The name is the result of belief that a certain amount of fluid electricity could be collected or condensed on a conducting surface. In its simpler form a condenser is two conductors separated by an insulating medium. The usual form consists of sheets of tinfoil separated by paraffined paper or sheets of mica with alternating sheets of tinfoil. The principle is illus-

trated by the Franklin plate, a piece of glass with pieces of tinfoil on each side. If a positively charged body or the positive conductor of an electric machine is connected with one of the tinfoil coatings it will communicate to it by conduction a positive charge. If the opposite plate is now connected with the ground the negative electricity is held while the positive is repelled and passes to the ground. Accordingly we have accumulated equal amounts of positive and negative electricity on the tinfoil. If the two surfaces are connected a bright spark results and the equilibrium is restored.

The favorite condenser used in electric-static work is the original Leyden jar. It is a wide-mouthed glass jar covered inside and out with tin-foil. One common use of condensers is in radio apparatus. The so-called *variable condenser* consists of a series of aluminum plates connected in parallel, which alternate with a set of fixed plates, also connected in parallel. See S. P. Thompson *Electricity and Magnetism*.

**Condillac, Etienne Bonnot de** (1715-80), French philosopher, spent his life on his estate of Flux, engaged in speculative studies. His *L'Origine des Connaissances Humaines* outlines his system, and, with the *Traite des Systemes*, is in opposition to the work of Descartes, Spinoza, and Leibniz. His own system is developed in *Traite des Sensations* and *Traite des Animaux*, in which he postulates sensation as the only source of knowledge, and to it traces the origin of all intellectual processes. His *Oeuvres Completes* appeared in 1821-3. See Rethore's *Condillac ou l'Empirisme et le Rationalisme*, Dewaule's *Condillac et la Psychologie Anglaise Contemporaine*, and Salky-kow's *Die Philosophie Condillacs*.

**Condition**, in law. A provision in an instrument in writing that its scope, effect, or validity, in part or as a whole, shall be dependent upon the happening or non-occurrence of an uncertain event.

**Conditional Immortality**, an eschatological theory which maintains that the soul is naturally mortal and that immortality is only to be obtained as the gift of God. The case of Sodom and Gomorrah is adduced as an example. See *Life in Christ*, by Edward White, Pettingell's *Life Everlasting*, and Salmond's *Christian Doctrine of Immortality*.

**Conditional Limitation**. In the law of real property, an estate in fee granted upon a condition which defeats or terminates the grantee's title upon the happening of some collateral event, or which causes the title to pass from the owner to another person on such event. For example, a house may be granted

to A, on condition that he live there, but if he remove, then to B. A's fee would be limited and qualified, but he could make it absolute by living on the premises all his life. Such estates may be created in the United States to-day.

**Condonation**, in law, the forgiveness granted by a husband or wife to his or her guilty partner for violation of the marriage vow.

**Condor** (*Sarcorhampus gryphus*), a very large South American vulturine bird of prey. Condors attack old horses, cows, and the smaller domestic animals, but rarely man, and no bird seems to have more powerful eyesight.

**Condorcet, Jean Antoine Nicolas Caritat, Marquis de** (1743-94), French philosophical writer; a freethinker, D'Alembert and Clairaut being his guides. His *Essai sur le Calcul Integral*, led to his election to the French Academy of Sciences, of which he afterwards became perpetual secretary. During the revolution he espoused the cause of the people, and was elected president of the Assembly in 1792. Proscribed at length by the extremists, he found refuge in the house of his friend Madame Vernet. His most important work, *Esquisse d'un Tableau Historique des Progres de l'Esprit Humain*, taught the perfectibility of man, and the perfect equality of civil and political rights for both sexes. Among his other books should be mentioned *Reflexions on the English Revolution of 1688 and that of the 10th August 1792*, and *Moyen d'apprendre a compter surement et avec facilite*. He was finally captured at Clamart, and died in prison at Bourg-la-Reine, April 6, 1794. See also the *Correspondence* between Condorcet and Turgot, 1770-9, *Critical Miscellanies*, by John Morley.

**Condottieri**, mercenary soldiers hired (*condotti*) by the Italian lords and unwarlike burghers to fight for them. In the 15th century the profession passed into the hands of adventurous Italians whose object was, if possible, to carve out a principality for themselves. One of them, Francesco Sforza, was fortunate enough to secure the duchy of Milan (1450). Hence there was constant distrust between them and their employers, one of them, Carmagnola, being executed by Venice on suspicion of treachery. The whole system of war degenerated into a farce, which was speedily exposed by the Ultramontane invaders. See J. A. Symonds's *Renaissance in Italy: Age of the Despots*.

**Conduction**, one of the important modes in which heat or electricity is transmitted

through matter. The portion of matter which transmits the heat or the electricity is called the conductor. Heat conduction takes place when neighboring parts of the same substance are at different temperatures, the heat flowing always from the warmer part to the colder part.

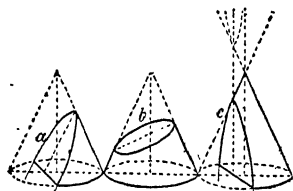
In the case of electrical conduction, the condition which determines the flow of current is the difference of electrical potential along a conducting channel. The laws governing the relation between current and potential difference are similar to those governing the relation between flow of heat and difference of temperature, and are particular cases of the mathematical theory first given by Fourier in his *Theorie de la Chaleur* (1822). In the case of ordinary steady electrical flow the law takes a very simple form known as Ohm's law. According to this law, the conductance is defined as the ratio of the current passing along a conductor to the potential difference acting along it. In a rough way, good conductors of heat are also good conductors of electricity. The conductivity of materials, both for heat and for electricity, is influenced by various physical conditions, such as pressure, temperature, strain, magnetic state, etc.

**Conductor**, in music, is the musician who conducts or directs an orchestra. He usually stands in front of the performers, either facing them or with his back to them, and beats time with a baton. The present method of conducting was introduced into England in 1820 by Spohr. Formerly the conductor, with his score before him, sat at a harpsichord or piano, and played only as occasion required, the orchestra taking its time from the leading violinist.

**Condylomata**, moist, flat, elevated patches occurring on the skin in secondary syphilis.

**Cone**, a surface generated by a straight line which constantly passes through a fixed point, called the vertex, and is subject to some other condition. This is the most general form of a cone, but the term is usually applied to the case where the generating line passes through a fixed point and moves round the circumference of a circle. This is technically called the cone of the second degree. The various figures obtained by sections of the cone of the second degree by a plane are as follows:—If the cone is cut by a plane parallel to any generating line, the section is a parabola; if by any other plane which cuts only one branch of the cone, the section is an ellipse, and in two particular cases circles; and if by a plane cutting both branches, a hyperbola. These curves, called conic sections, were first discovered by Greek

mathematicians when studying the right circular cone.



*Sections of the Cone.*

a, Parabola; b, ellipse; c, hyperbola.

**Conegliano**, town and episcopal see, province Treviso, Italy; the birthplace of Cima da Conegliano, and famous for its wine; p. 10,252.

**Cone-shells** (*Conus*), gasteropod molluscs which chiefly inhabit tropical seas.

**Coney**. One of the English names of the European rabbit, the source of domestic rabbits.

**Coney Island**, island and resort, borough of Brooklyn, N. Y., extending from the entrance to New York Harbor 5 m. along the shore of Long Island, being the first section of an extensive sand bar on that coast. The most popular portion is filled with all sorts of itinerant shows and cheap places of amusement.

**Confarreation**, the highest and most solemn form of marriage among the ancient Romans.

**Confectionery**. This branch of cookery includes the preparation of all articles of food rich in sugar. During the last few decades the variety and quantity of such preparations have increased enormously.

**Confederacy, United Daughters of the**. A society organized at Nashville in 1894. The membership is composed of widows, wives, mothers, sisters, and female descendants of officers of the Confederate army or navy, or of those who held civil offices under the Confederacy or gave aid to it.

**Confederate States of America**, the federal union of the eleven southern states which seceded from the United States in 1860-1 and tried unsuccessfully in the war of 1861-5 to establish a permanent independent government. The eleven states were South Carolina, Mississippi, Florida, Alabama, Georgia, Louisiana, Texas, Arkansas, North Carolina, Tennessee, and Virginia. On Feb. 4, 1861, at Montgomery, Ala., a provisional Congress of the states which had then seceded—South Carolina, Louisiana, Mississippi, Georgia, Alabama, and Florida, the Texas delegates

being appointed later—met, and four days later adopted a provisional constitution for the Confederate States. On Feb. 9, Jefferson Davis of Mississippi was chosen provisional president, and Alexander H. Stephens of Georgia, provisional vice-president. On Mar. 11 a permanent constitution was adopted. Richmond, Va., on July 20, 1861, supplanted Montgomery as the capital of the Confederate States.

The Confederate Constitution was in large part identical with that of the United States, a majority of the sections being textually the same except for the substitution of the words 'Confederate States' for the words 'United States.' Certain important changes were, however, introduced. In the first place, naturally, these changes emphasized the rights of individual states and secured to slaveholders rights which the South had long contended for before the war. The Federal government was prohibited from granting bounties, enacting any protective tariff, or appropriating money for any internal improvement intended to facilitate commerce, 'except for the purpose of furnishing lights, beacons, and buoys, and other aids to navigation upon the coasts and the improvement of harbors and the removing of obstructions in river navigation.' The importation of 'negroes of the African race from any foreign country other than the slaveholding states or territories of the United States' was expressly forbidden, and power was conferred on Congress to prohibit *all* importation of slaves, should it see fit to do so. There were other changes in regard to term of office, amendments, and voting.

This Constitution is interesting from various points of view, and in some respects (*e.g.* in giving to the President power to veto separate items of appropriation bills) it was probably superior to the United States Constitution, but it was of course never put to a test under normal conditions. The exigencies of a long and stubborn war inevitably caused centralization, the government of the Confederacy developed into a sort of military autocracy. The economic weakness of the Confederacy, moreover, as compared with the United States, soon became apparent; her industries were not greatly diversified, and manufacturing, formerly neglected, could not be developed sufficiently, and the enormous issues of paper money brought demoralization and depreciation in their train. At Richmond, early in 1864, flour sold for \$300 a barrel and shoes for \$150 a pair in Confederate currency. The Confederacy, moreover, was unable to secure expected recognition and the expected financial assistance abroad; though,

early in the war, it was recognized as a belligerent by Great Britain and other European governments. At the close of the war, therefore, the Confederate States were thoroughly exhausted, and with the surrender of General Lee the government immediately collapsed. See SECESSION, CIVIL WAR, and UNITED STATES, and consult Jefferson Davis, *Rise and Fall of the Confederate Government*; A. H. Stephens, *Constitutional View of the War between the States*; Pollard, *The Lost Cause*, and *Life of Jefferson Davis and the Secret History of the Confederacy* (1869); Schwab, *The Confederate States of America* (1901), essentially an economic history; Callahan, *Diplomatic History of the Southern Confederacy* (1901); Curry, *The Civil History of the Government of the Confederate States* (1901); Richardson (ed.), *Messages and Papers of the Confederacy* (1905); and Rhodes, *History of the United States from the Compromise of 1850* (1893-), especially vol. v.

**Confederate Veterans, United Sons of.** An organization formed in 1896 in Richmond, Va., with objects similar to those of the United Confederate Veterans. Male descendants of Confederate veterans only are eligible for membership.

**Confederate Veterans, United.** An association organized in New Orleans in 1889 to unite all associations of Confederate veterans, soldiers, and sailors, to gather authentic historical data of the war, to preserve records and relics, to aid widows and dependents, the disabled and the needy, and to cherish the ties of friendship.

**Confederation**, strictly used, implies the loosest form of bond or union into which communities, large or small, enter for the purpose of forming one state, the individual communities retaining the largest possible measure of sovereignty. The United States has gradually evolved from a loose confederation to a strong union, where the central government has extensive powers of direct control over the individual citizens of the component states.

**Confederation, Articles of.** See **Articles of Confederation**.

**Confederation of the Rhine**, an alliance of smaller German states, formed, under the instigation and protection of Napoleon, after the supremacy of Austria in the German world had been destroyed by him in 1805. The armies of the confederation served in Napoleon's campaigns; but the disasters of the Russian war, and the sudden growth of German national feeling, caused the break-up of

the confederation, which lasted from 1806 till 1813.

**Conference** is an assembly of delegates from a number of states for the purpose of deliberation regarding questions of common interest. As its name implies, its functions are deliberative rather than executive; but the distinction between a conference and a congress which is executive in character is not easily drawn or always observed. Thus the peace conference at The Hague was nominally deliberative only, but public opinion has in some degree changed its resolutions into executive degrees. The name is also applied in a general way to representative assemblies: for example, the supreme synod of the various Methodist churches is called a Conference.

**Conferva**, a genus of green algæ, having the thallus many-celled, thread-like, and unbranched. These plants are common in ponds and ditches, attached to other aquatic vegetation, submerged stones, wood, etc., and often occur on the shells of fresh-water molluscs.

**Confessio, Confession, Confessional, or Confessionary**, the tomb of a saint or martyr. The name originated in early Christian times, when the relics of those who died for the faith were regarded by their fellow-Christians with deep and reverential affection. The belief in a certain efficacy in the touch or presence of relics was widely entertained. A confessio is the grave over which an altar was erected, the chamber in which it stood, or a niche in the body of an altar for the purpose of containing relics; later, the entire building erected over such a grave, with all that it contained, was called a confessorium or confessio.

**Confession**, in religious usage, commonly means a declaration of sins to a priest to obtain absolution. Public or open confession before the entire congregation was a practice of the early church. Private confession probably originated in the monasteries and spread thence to the laity gradually and not without opposition. When it had become a general custom the fourth Lateran Council (1215) made it a law of the church by enacting that every mature Christian should confess at least once in each year to a properly approved priest. The Council of Trent declared the three 'acts of the penitent' which constitute the sacrament of penance to be contrition, confession, and satisfaction. Confession is included in the ritual of the Greek and other Oriental churches. The Reformers abolished its compulsory character and in general it may be said that private confession has no place in Protestantism. The



Church of England has a general confession followed by a form of absolution in the order of both morning and evening prayer, and countenances private confession in the visitation of the sick. The Protestant Episcopal Church retains the general confession only.

**Confession.** In law, either a voluntary statement by one person to another private individual to the effect that he has committed a crime, or of his connection with one; or the admission of a prisoner, charged with crime, that he is guilty. A confession is not admissible in evidence against a prisoner, if it was procured by an officer of the law under threats, or false promises of favor.

**Confession of Faith.** Confessions of faith do not differ essentially from creeds. Both are a sort of authorized program setting forth the opinions of a church or section thereof. The great confessions are closely connected with the Reformation. The *Augsburg Confession*, drawn up by Melancthon from Luther's materials, was presented at the Diet of Augsburg in 1530. It is one of the first of a long series of 'confessions' connected with articles of belief in Lutheran and Calvinist theologians, some with national titles indicating their political importance. The two great English confessions are the *Thirty-nine Articles* of the English Church and the *Westminster Confession*.

**Confirmation**, in religious usage, signifies the acceptance and ratification in proper form of the choice of a certain person for a church office. The confirmation of the baptized is a very ancient custom, and may be said to be apostolic. It is one of the seven sacraments of the Roman Catholic Church, and is performed by the bishop, who makes the sign of the cross on the forehead of the candidate with the chrism and gives him a slight blow on the cheek, signifying that he must suffer buffeting for Christ; the age is usually 10 to 16 years. In the Greek Church the rite may be administered by any priest and follows baptism. In the churches of the Anglican communion it is administered by the imposition of the bishop's hands upon those who are presented to him by their pastors as prepared to receive it, and is necessary for admission to the holy communion; those who are confirmed renew the vows made for them at baptism by their sponsors. Lutheran churches have a similar custom. In other Protestant churches a public confession of faith before the first communion takes the place of the rite.

**Confiscation.** In law, taking a person's property, without adequate compensation,

under the authority of the state. By the ancient common law of England the term was applied almost exclusively to the seizure by the state of stolen goods, stray cattle, and the goods of a traitor. However, both in England and the United States the term is now most commonly used to denote the act of the government in seizing goods on which import duty or other revenue has not been paid under circumstances which prove that the owner intended to defraud the government. It is also sometimes applied to the sale of real property by the state for the collection of taxes. In international law, it denotes the taking of the property of an alien enemy found within the country in time of war and also the capture and appropriation of contraband of war and neutral vessels on which it is carried.

**Conflict of Laws.** A variance or opposition of the laws of different nations or states in cases where, by reason of the residence of the parties to the controversy in different jurisdictions, the situation of the subject-matter of the action, or for some other reason, it becomes necessary to determine whether the laws of one state or country or another shall be applied to the facts before the court. Where the laws of two or more nations differ upon certain points there is a conflict of law. The question then is in a given controversy, which law will prevail? In the United States there is a constant conflict between the laws of the different states, and this conflict often causes great confusion. The same is true of foreign nations. See INTERNATIONAL LAW.

**Confucius** (551-479 B.C.), the Chinese sage, born at the modern Sze-chuen, in Shan-tung province. 'Confucius' is simply a Western corruption of 'K'ung fu-tsze'—i.e. the *fu-tsze*, or 'philosopher,' whose family name was K'ung. He lost his mother at the age of twenty-four, and had in consequence to retire for three nominal years (twenty-seven months) from the public service. After this Confucius resumed his archaeological, musical, historical, and official studies. In order the better to balance his thoughts, he even paid a visit to the imperial court, the keeper of the archives being the celebrated mystic Lao-tsze, whose somewhat incomprehensible philosophy was then the religion of the better educated classes. It appears that Lao-tsze's obscure exhortations were not found convincing by Confucius, who had now set up a 'school of thought' of his own, the essence of which seems to have been 'how to get through life like a courteous gentleman.' When the rising teacher had attained his thirty-sixth year, he found it necessary to

fly from home in order to avoid political disputes dangerous to his mental and physical well-being. After some years' residence in the neighboring duchy of Tsi, he resumed his scholastic teaching in his native land, and at the age of forty-seven again accepted public office under a new duke. His administration proved so sagacious and successful that the contiguous states gradually grew uneasy. Intrigues were accordingly set on foot, and Confucius went into voluntary exile for thirteen years. On his return, Confucius found congenial employment in composing a history of Lu from B.C. 722. This is the first known attempt at systematized Chinese history, apart from myth and vague tradition. Confucius also collected the poems, folk-lore, annals, songs, and rites then in vogue in various parts of the empire. Editing and pruning these, he produced what are still known as the classics—the *Book of History* (or Tradition), the *Book of Odes*, the *Book of Changes* (or Oracles), the *Book of Rites*, and so on. To these his pupils and descendants subsequently added Confucius's own apothegms, and one or two works on ethical philosophy. The sage died in his seventy-third year, his last words being an expression of regret that no rulers existed with sufficient sagacity to appreciate his teachings properly.

It is not easy for Europeans to understand exactly why Confucius's influence over Chinese thought has been at once so great and so unshaken. In a Chinese world of greed, self-indulgence, intrigue, and disloyalty, Confucius pleaded for truth, industry, justice, moderation, and public duty. His doctrines are naturally best appreciated in their native garb.

Confucius was not officially honored at his death. It was not until the old feudal empire had been destroyed that, in B.C. 195 the founder of the still existing Chinese political system paid a visit to the philosopher's tomb. For fuller particulars, see *Life and Labors of Confucius*, by E. H. Parker. Various works of Confucius are translated into English by Legge in *Sacred Books of the East* (1879-85).

**Conger**, or **Conger Eel**, a genus of bony fishes, remarkable for the exclusively marine habitat, the large size (up to eight feet), the scaleless skin, and the large gill openings.

**Conger, Edwin Hurd** (1843-1907), American diplomatist; minister to Brazil in 1891-93 and 1897-98 and China in 1898-1902, and to Mexico in 1905; was besieged with the other diplomatists in Peking during the Boxer outrages in 1900; and was chief of the commission

which negotiated a commercial treaty with China in 1902.

**Congestion**, or **Hyperaemia**, a term used in medicine to denote an excess of blood in any particular part of the body. It must be distinguished from plethora, in which the excess of blood is not local, but general. Congestion is commonly divided into two classes—active or arterial, and passive or venous. Active or arterial hyperaemia is produced by disturbances of various parts of the nervous system, due to various causes, or may be the mechanical result of increased cardiac action, which is itself produced by nerve stimuli.

Passive or venous congestion is caused either by a lack of driving-power in the heart, or by an obstacle which dams the current at some point. When a tight bandage is applied to a limb, congestion soon arises in that part of the limb which is away from the trunk. The surface becomes blue and cold, and if the bandage be retained the limb swells, and presently local degeneration sets in, followed by death of the part. Thus, active congestion is a hurried oncoming of blood, but passive congestion is a delay in going.

**Conglomerate**, a rock which may be regarded as a consolidated gravel. It may consist of fragments of any kind of rock held together by a matrix of clay, sand, or other materials. The pebbles in conglomerates are mostly rounded and water worn.

**Congo, Belgian** (formerly CONGO FREE STATE), territory in South Central Africa. It is bounded on the n. by the French Congo, French Sudan, and Egyptian Sudan; on the e. by Uganda, Tanganyika Territory; and Rhodesia; on the s. by Rhodesia and Portuguese West Africa (Angola); and on the w. by Portuguese West Africa, the Atlantic (where, however, its seaboard is only 20 m. long), and the French Congo. Its area is estimated at 918,000 sq. m.

The outstanding feature of its physical conformation, apart from its great river and its affluents, is the central plateau, some 2,500 to 5,000 ft. above sea level, embracing vast regions of primeval forest. The mean annual temperature ranges from 73° to 79° F. In the equatorial regions there is little distinction of seasons. The rainfall is very heavy, ranging from 38 inches on the coast to 120 inches in parts of Ruwenzori. The climate is generally unhealthful for Europeans, except on the highlands. The soil is well watered and fertile.

The whole Congo basin is believed to be an ancient lake bottom, now overlaid by hori-

zontal rock deposits. Mineral resources include tin, iron, gold, copper, salt, limestone, petroleum, manganese, diamonds, mercury, and precious stones.

Characteristic tropical flora — bamboo, palms, papyrus, rubber, indigo—are found, and the animals are the usual African species. Insect life, favored by the climate, here reaches its greatest African development.

The Katanga is the richest mineral district of the Congo, and one of the richest copper districts in the world, containing the famous Star of the Congo mine. The chief supply of gold comes from the Kilo mines, near Lake Albert.

The principal agricultural products are rubber, palm nuts and oil, copal, and cacao. Ivory is abundant, tropical fruits are found in quantity. Katanga is well suited to stock raising and live stock is being imported.

In 1941 there were 3,100 miles of railroad. The railroad in Katanga is a part of the Cape to Cairo Railway. There is a regular air service from Leopoldville to Luebo once every three weeks. The service takes one day and letters are carried without extra fee. A fleet of more than a hundred steamers and barges operating on the Congo and its tributaries form a valuable aid to the transportation problem. Canoes are also extensively used for transport. There are few roads, and merchandise for the interior is carried by native porters. Telegraph and telephone lines are owned and operated by the government. Seventeen wireless stations have been established. Cable communication is maintained with Europe from Boma. There is regular steamer connection with European ports every four weeks. Trade is carried on almost entirely with Belgium.

The greater part of the population is of Bantu stock. Interspersed among them are pigmies. Negroes inhabit the basin of the Welle. Stanley's estimate of the native population was 35,000,000; but their numbers have greatly diminished, and were estimated at 11,000,000 in 1941. The white population—chiefly Belgians and English—numbered about 22,000. Kiswahili is the language spoken by the natives who have been under Arab influence. On the Upper Congo the common language is Bangala and on the Lower Congo it is Fiole.

The religion of the natives is a gross fetishism but mission work is active everywhere. There are 247 mission stations, with 1,692 missionaries of whom 1,076 are Catholic. They cooperate with the Government in the matter of education and the mission schools and small

government night schools furnish the only facilities for primary education. Several agricultural schools and libraries have been established. A special staff to combat sleeping sickness has been organized. The Congo is administered by a governor-general who is appointed by the Minister for the Colonies, and is assisted by several vice-governors-general.

Early in the 14th century a native kingdom was formed in the Lower Congo by the Bantu chief, Emini-a-nzima. In the closing years of the 15th century, through the Portuguese explorer Dom Diego Cam, Christianity was introduced; and in 1534 a cathedral was built at the capital, which was renamed San Salvador. Portuguese influence, strong in the 16th, waned in the 17th century, and the cathedral was abandoned. From 1782 to 1857 the Congo remained unvisited by Europeans.

Henry M. Stanley, on his return, in 1877, from his great exploration down the Congo, induced Leopold, king of the Belgians, to found the International Association of the Congo, with the object of exploration and commercial development. Stanley went out again to the Congo (1880-84), and concluded commercial treaties with various chiefs, establishing over twenty stations on the Congo and its tributaries by means of funds supplied by King Leopold.

The independence of the new territory was guaranteed by the Congress of Berlin (1884-5), the international agreements providing free trade for all nations, the prohibition of trade monopolies, fair treatment of the natives, and the suppression of slavery.

The actual boundaries of the Belgian Congo have been secured by various conventions with the European powers from 1885 to the present time. A convention with France, ratified in March, 1912, settled the boundaries between French and Belgian Congo, and established a commercial agreement. The delimitation of the eastern frontier between the Congo, on the one hand, and Uganda and German East Africa, on the other, was completed in September, 1912. In the interior, the only important event has been a successful war (1892-3) against the Arabs.

Conditions in the Congo in 1901 and succeeding years gave rise to protests from Great Britain as violations of the Berlin agreement. In addition, complaints were made by consuls and missionaries of deplorable cruelties committed by overseers and other officials. A commission of inquiry appointed by Leopold recommended revision of the land laws, of

taxation, and of the administration of justice.

Annexation by Belgium was approved by the Belgian Parliament in 1908. In 1911 numerous public buildings were erected in the important towns. The reforms authorized in 1910 contemplated the gradual abandonment of the forced labor system and the opening of the country to trade.

Following the Great War the districts of Ruanda and Urundi (formerly in German East Africa) were ceded to Belgium as a mandatory under the League of Nations. This gives to the Belgian Congo an additional territory of about 21,000 sq. m. In 1942, with the loss of Malaya and the East Indies, the Belgian Congo became of vital importance to the United Nations as a source of supply of rubber, tin, and various tropical products.

Consult Stanley's *Through the Dark Continent*, and *Congo and Founding of Its Free State*; Bentley's *Pioneering on the Congo*; MacDonnell's *King Leopold II., His Rule in Belgium and the Congo*; Weeks' *Congo Life and Folklore*; Starr's *Congo Natives*.

**Congo, French.** See **French Equatorial Africa**.

**Congo River, The** (earlier known as the ZAIRES, named by Stanley the LIVINGSTONE), the second largest river in Africa, forming a curve of about 3,000 m. in length, and draining a basin of nearly 1,500,000 sq. m. The two great tributaries of the Congo are the Mobangi, from the north, and the Kassai, from the south.

The Upper Congo (above Stanley Pool) is a succession of narrows and broad, lake-like expanses, containing large islands. The country here is flat, and thousands of square miles are inundated during the flood seasons. Between Stanley Falls and Stanley Pool (1,000 m.), the river is navigable for steamers of four feet draught. The 100 m. from the mouth to Matadi is navigable for ocean steamers of twenty feet draught.

Until the 19th century, all that was known of the Congo was its mouth, discovered in 1482 by Diego Cam, and thence up to San Salvador. In 1871 Livingstone discovered its upper waters, the Luapula and Lualaba. In 1876-7 Stanley followed the Congo to the sea, and for the first time revealed its complete features. Consult Johnston's *George Grenfell and the Congo* (1908).

**Congregation**, a collective term most commonly used of a local body of worshippers, either as assembled together in one place, or as a community—the unit of a greater church or denomination. In the Roman Catholic

Church, it is a term applied to a board of ecclesiastics elected for specific purposes.

**Congregationalism** is a combination of the two principles of independence of the local church with complete control of all its concerns, and the fellowship with one another in voluntary association of such independent churches. These principles exclude alike prelacy and presbyterianism, and make the local church supreme in matters of faith and practice.

The Congregationalism of England and the United States has its roots in Puritanism. The first important name in its development is Robert Browne (1550-1633). Persecution led several leaders to emigrate to Holland (1592). There they were tolerated, and flourished among English residents, but became divided among themselves on the lines of Baptists and the true Congregationalists. From Holland both types of Independency were re-imported into Britain. Parties of Individualists, Anabaptists, and Antinomians formed themselves.

Combatants from America joined in the ecclesiastical struggle that raged after the fall of Laud (1640). Cromwell and other victorious leaders in the civil war were Independents, and it was largely due to their efforts that Presbyterians did not gain a persecuting ascendancy. During the Protectorate the Independents prospered in England, and, through the army, gained a hold on Scotland.

The early part of the 18th century was a time of deadness in the Congregational Church. The 19th century was marked by a growing tendency to combination. About 1811 the Congregational Union of Scotland was formed; and in 1829 the Congregational Union of Ireland. In 1833 a similar union was set up for England and Wales. In 1896 the Evangelical Union and the Congregational became one.

Congregationalism was brought to America by the settlers of the *Mayflower* (1620), who, driven from England in 1608, had found refuge in Holland. By 1650 there were 51 Congregational churches in New England; and until the end of the century New England had few churches of other sects. The success thus early attained has largely influenced the type of church polity in this country. In the early part of the 19th century, home missionary associations were formed, which helped to establish colonies, and organized colleges and schools, as well as churches, in the new United States territory in the West. The growth of Congregationalism was temporarily checked by the failure of a plan of union with the

Presbyterians, by which the former lost 2,000 churches; and, a few years later, by the loss of 120 churches to the Unitarians.

Since 1850 the Congregationalists have held more firmly together. National conventions were assembled in 1852 and 1865, and continued triennially from 1871 till 1913 and biennially since that time. Congregational worship is essentially non-liturgical. The sermon is the central element and the service includes free prayer, singing and the reading of the Word of God. There is no official creed. In 1924 union was effected with the Christian church. Consult Jefferson's *Congregationalism* (1910); Fagley's *The Congregational Churches*.

**Congress**, the name applied to meetings or assemblies of accredited representatives of the greater Powers for the purpose of discussing and determining the future policy of the Powers regarding some important object.

The Congress of Vienna was the first international assemblage to discuss social and economic subjects, such as the slave trade and the freedom of navigation on international rivers. Since that time, however, more than 125 congresses have been held for such purposes. Among the subjects considered have been international postal, passenger and freight, and telegraph and telephone services; marine signals, weights and measures, coinage, agriculture, international law, humanity in war, and world peace. The name Congress is also applied to periodical meetings of private associations, especially when such associations are international.

**Congress, Continental.** See **Continental Congress**.

**Congress, Library of.** See **Library of Congress**.

**Congress of the United States.** See **United States**, section on *Government*.

**Congreve, Richard** (1818-99), English philosopher and writer, the principal British exponent of Comte, relative to whose 'religion of humanity' he published *Translation of Comte's Catechism of the Positive Religion* (1858), and *Essays, Political, Social, and Religious* (1874), in addition to other works on history and politics.

**Congreve, William** (1670-1729), English dramatic poet. He wrote his solitary novel, *Incognita*, in 1687. In 1691 he came up to London, and threw himself eagerly into the life of literature and the coffee-houses, becoming acquainted with Dryden and Southerne; published his novel; and produced a comedy, *The Old Bachelor*. This raised Congreve at a bound to the front rank of contemporary poets.

Subsequently he produced *The Double Dealer*; *Love for Love*, his masterpiece; and his only tragedy, *The Mourning Bride*.

In 1698 Jeremy Collier began his series of attacks on the immorality and profaneness of the stage, and Congreve was among those who suffered most. He attempted to reply to Collier, but without tact or temper. Congreve produced a new comedy, written with inimitable care and wit, *The Way of the World*, but it proved a comparative failure. In deep disgust, 'Mr. Congreve quitted the stage early, and comedy left it with him.' He published other works, some non-dramatic. He collected his *Works* in 1710. He died in Surrey Street, on Jan. 19, 1729, and was buried in Westminster Abbey.

Congreve is by far the most distinguished exponent of artificial comedy in English literature. He belongs to the school of Moliere, and the vigor of his invention and the splendor of his wit are, perhaps, without a rival in any modern drama, and his delicate literary skill would give him an extraordinary eminence if it were not for his absence of tenderness and simplicity. But as a writer of the prose comedy of manners, Congreve continues pre-eminent. Editions of his works appeared in 1710, 1753, and 1840, the last edited by Leigh Hunt. Consult *Life* by C. Wilson.

**Congreve, Sir William** (1772-1828), English inventor. His father was controller of the royal laboratory at Woolwich, and young Congreve succeeded him in 1814. In 1808 he invented the rocket named after him; though its moral effect was satisfactory, its destructive effect was small.

**Conibos (Manoas)**, South American Indians in Peru. They appear to be a branch of the Panos whose language they speak. They are noted for their curious facial painting in red and blue stripes, and for the silver rings worn in their lips and noses. Large numbers are employed by the traders to collect sarsaparilla.

**Conic Sections** are the curves formed by the plane sections of a right circular cone. See **GEOMETRY**; **CONE**; **CIRCLE**; **PARABOLA**; **ELLIPSE**; **HYPERBOLA**. Consult Smith's *Conic Sections* (1910).

**Conifers**, a large and important order of shrubs and trees, characterized by bearing their fruits in a strobilus or cone. Conifers include the pine, cypress, and yew. They are often able to grow on the shallowest of soils when deep-rooting trees would quickly perish. In consequence of the tall, comparatively unbranching trunk which most conifers possess.

and the needle-like shape of their leaves, they offer little purchase to the wind and consequently thrive in mountainous and other windy districts. The leaves of conifers are mostly evergreen, except in the larches and ginkgos.

Most of the conifers are natives of the temperate parts of Europe, Asia, and America—often occurring at great heights, however, where the cold is intense. The wood of hemlock, pine, cedar, fir, and many other conifers is of inestimable value. The bark of hemlock is used for tanning. Naval stores, gum, and lesser products are obtained from this family. For centuries the 'Hollanders,' or timber merchants of the Black Forest, used to ratt their logs down the Rhine to the Netherlands; and these 'small kings' have acquired a niche for themselves in German literature.

Fossil conifers are found in the Mesozoic and Tertiary geological formations in great abundance as broken branches, cones, etc. Consult Sargent's *Silva of North America*; Mosher's *Studies of Our Cone-Bearing Trees* (1910); Chase's *Cone-Bearing Trees of the California Mountains* (1911).

**Conine, Coniine, Coneine, Conia** ( $C_8H_{17}N$ ), a yellowish, oily, poisonous liquid with a strong odor similar to that of mice; derived from the poison hemlock. See **HEMLOCK**.

**Conington, John** (1825-69), English classical scholar. The labor of his life was his edition of Virgil (1861-8). He also edited Æschylus' *Agamemnon* (1848) and the *Choephore* (1857); he executed many translations. Consult his *Miscellaneous Writings*.

**Coniston Water**, lake in Lancashire, England. Its special feature is the mountain known as Coniston Old Man.

**Conjevaram (Kanchi, Kanchipuram)**, municipal town, India. It is one of the seven holy cities of India, and is called the 'Benares of the South'; p. 61,000.

**Conjugal Rights**. See **Husband and Wife**.

**Conjugate Deviation**, a symptom often appearing in apoplexy. Both eyes and head are turned toward that side on which exists the brain lesion producing the disorder.

**Conjugation**, in biology, is a sexual process, the intimate union of two cells of different origin. The union may be permanent, as when the conjugates are ovum and spermatozoon; or temporary, as in Paramœcium, where separation takes place after an interchange of nuclear fragments. See **CELL**.

**Conjugation**, in grammar, denotes the changes in a verb by inflection or by combina-

tion with auxiliaries to show tense, voice, mode, person, and number. Also, a word or phrase used to join words or groups of words.

**Conjunction**, in astronomy, is the meeting of two heavenly bodies in the same longitude. When they coincide in latitude as well, an occultation, a transit, or an eclipse occurs. Conjunctions are also defined as occurring at times of zero elongation—i.e., when angular distance from the sun becomes = 0. The moon is 'new' when in conjunction with the sun.

**Conjunctiva**, a mucous membrane lining the inner surfaces of the eyelids and the front of the eyeball. The conjunctiva acts as a lubricating surface.

**Conjunctivitis**, inflammation of the conjunctiva, found in three important varieties—catarrhal, purulent, and granular—as well as in other less frequent forms. **CATARRHAL CONJUNCTIVITIS** may be acute or chronic. In the *acute* form, the conjunctiva on the lid is red and swollen, and there is a more or less profuse mucous secretion, with an itching or smarting sensation in the eyes, as in *pinkeye*. The *chronic* form is found chiefly in adults, and is characterized by the red lids and the comparative absence of discharge. **PURULENT CONJUNCTIVITIS** is regularly due to infection with gonorrhœal virus and may cause ulceration and complete blindness. The lids are red and greatly swollen; there is a profuse, purulent discharge, and the eye is tender and painful. For **GRANULAR CONJUNCTIVITIS**, see **TRACHOMA**. Consult Horman's *Preventable Blindness* (1907).

**Conjuring** has been described as the production of apparently supernatural effects by natural means, the methods whereby these effects are wrought remaining concealed. It includes the performance of mystifying tricks and illusions by mechanical devices, and other means, and embraces feats of legerdemain, sleight of hand, and prestidigitation. But the modern conjurer calls to his aid the principles and deductions of such abstruse sciences as optics, electricity, and magnetism. Conjuring, under the name of black magic or witchcraft, dates from the remotest antiquity. Conjuring in Afro-American folklore is the casting of spells or enchantments. See **MAGIC**. Consult Downs' *Art of Magic* (1909); Goldston's *Tricks and Illusions for Amateur and Professional Conjurers* (1909).

**Conklin, Edwin Grant** (1863- ), American zoologist, has made extensive studies on the embryology of molluscs, ascidians, and other invertebrates, and upon the fundamental laws governing the development of egg and

embryo. His most important contribution has perhaps been the demonstration of localized formative substances in the egg at a very early stage. His best known published work is *Heredity and Environment*.

**Conkling, Roscoe** (1829-88), American political leader, orator, and lawyer. In Congress his exceptional ability as a debater and his remarkable oratorical powers gave him great influence. This influence was impaired, however, by personal antagonisms, and particularly a long and bitter political feud between him and his fellow Republican leader, James G. Blaine. During the Civil War and Reconstruction periods Conkling allied himself, on various occasions, with the more radical members of his party. Consult his *Life and Letters* (1889), edited by A. R. Conkling; Ingersoll's *Memorial Address*.

**Conn, Herbert William** (1859-1917), American biologist, made special investigations as to dairy products. He was one of the founders of the American Society of Bacteriologists. He published, in addition to several physiologies for school use, and over 150 scientific memoirs, *Evolution of To-Day* (1886); *The Living World* (1891); *The Method of Evolution* (1900); *Agricultural Bacteriology* (1901); *Bacteria, Yeasts, and Moulds in the Home* (1903); *Bacteria in Milk and Its Products* (1903); *Practical Dairy Bacteriology* (1907); *Biology* (1912).

**Connaught**, the smallest of the four provinces of Ireland, occupies the western part of the country. The Shannon forms the boundary on the e. and s.e. It was formerly one of the Irish kingdoms, and was ruled by the O'Connors.

**Connaught and Strathearn, Arthur William Patrick Albert, Duke of** (1850-1942), third son of Queen Victoria, born at Buckingham Palace; his dukedom was conferred upon him in 1874. Destined for the army, received his commission in 1868. His promotion was rapid; in 1880 he was made major-general. In 1871, when he attained his majority, an annuity of \$75,000 was granted to him, and this was augmented by \$50,000 on his marriage. He married Princess Louise Margaret of Prussia (born July 25, 1860), third daughter of Prince Frederick Charles, in 1879. In 1902 was made a field marshal; in 1904 was appointed to the newly created post of inspector-general of the forces, and in his official capacity visited South Africa early in 1906. In 1905 he was made personal *aide-de-camp* to Edward VII. His eldest daughter, Princess Margaret, was married to Prince

Adolphus of Sweden. His younger daughter, Patricia ('Princess Pat'), was married to the Hon. Alexander Ramsay, a naval officer. In 1907 the Duke became commander-in-chief and high commissioner in the Mediterranean; and in 1910 again visited South Africa, where he opened the first parliament of the Union of South Africa. In 1911 he succeeded Earl Grey as Governor-General of Canada, being succeeded, in 1916, by the Duke of Devonshire.

**Conneaut**, city, Ohio, on Conneaut Creek two miles from Lake Erie. It has a good harbor, is an important point in the shipment of iron ore, coal, and steel, and has one of the best-equipped lighthouses on fresh water; p. 9,355.

**Connecticut**, (popularly called the 'Nutmeg State'), one of the original thirteen States of the United States and one of the New England group, is bounded on the n. by Massachusetts, on the e. by Rhode Island, on the s. by Long Island Sound, and on the w. by New York. The total area is 4,965 sq. m., of which 145 are water surface. The State has eight counties.

Several ranges of hills traverse the State from n. to s. The Housatonic, lying farthest west, rises highest; the Green Mountains extend southward to near New Haven; the Mount Tom Range and the Blue Hills lie farther east. Bear Mountain (2,355 ft.) and Gridley Mountain (2,200 ft.) are the highest points in the State. Three rivers of considerable size cross Connecticut from north to south—the Housatonic, the Connecticut, and the Thames with its tributaries. The coast line measures a hundred miles, and is indented by numerous bays with excellent harbors. Many islands lie off shore.

The climate is temperate, although the weather is changable. The mean annual temperature is about 50° F., the average for winter being 27° and for summer 72°. The average annual rainfall amounts to about fifty inches. The snowfall is rather heavy. Stony soils cover much of the upland country; rich alluvial soils and loams occupy the valleys; and thin, sandy soils lie along the coast.

Building stones, as brownstone, slate, and granite, are produced in quantities. The Salisbury Iron Mines are probably the oldest in the United States and coal deposits occur at Simsbury and Bristol. Tungsten is found but the mineral resources of Connecticut are not extensive.

Connecticut is preeminently a manufacturing State, and the growth and concentration

of its population have been closely related to the increase in the importance of its manufacturing industries.

Bridgeport, New Haven, and New London are seaports of considerable prominence, and afford ample opportunities for domestic coastwise traffic and commerce. In addition, the main line of the most important railroad system in New England traverses Connecticut, and gives direct connection with all parts of the country.

According to the Federal Census for 1930, which covered manufacturing activities in 1937, there were 2,892 establishments. The total value of products was \$899,401,000, while the value added by manufacture (value of products less cost of materials, fuel and purchased current) was given as \$492,000,000. This census of manufactures covers manufacturing, printing and publishing establishments whose products turned out during the census year were valued at \$5,000 or more. Repair shops and establishments engaged solely in custom work, such as custom tailor shops, are not included.

According to the 1930 Census of Distribution, there were 141 hotels operating continuously in the State. The canvass did not include apartment houses, boarding houses, clubs, Y.M.C.A.'s and Y.W.C.A.'s. There were also 35 hotels of the resort type in operation from two to eight months of the year. Connecticut, 1938, had 73 mutual savings banks with total deposits of \$717,364,669 and total assets of \$799,831,070; and 66 State banks and trust companies with total assets of \$324,374,183. In Hartford are home offices of many leading insurance companies.

According to the Federal Census of 1940 the population of Connecticut was 1,709,242, urban, 1,158,162, and rural, 551,080. Hartford, the capital and largest city, had 166,267; New Haven, the second city, had 160,605; Bridgeport coming third with 147,121.

Education is free for all children over four years and compulsory for all between seven and sixteen years. Physical training is obligatory. In 1941 there were 1,111 public schools with 302,970 pupils. There were four State normal schools, at New Haven, Danbury, New Britain and Willimantic. The State also maintains the Connecticut Agricultural College at Storrs. State expenditure for public education (1937-38) amounted to \$31,177,079. Trade schools are maintained in many cities. The institutions for higher learning include Yale University at New Haven; Wesleyan University at Middletown; Trinity College at

Hartford, and Connecticut College for Women at New London. The control of the State institutions is vested in a Department of Public Welfare.

A section of the magnificent State Merritt Highway, and the Connecticut River Bridge at Middletown, were opened to travel, 1938. Eastern Connecticut suffered severely from the hurricane, 1938.

The present constitution of Connecticut was adopted in 1818 and has since been frequently amended. The executive power is vested in a Governor, Lieutenant-Governor, Secretary of State, Treasurer, and Comptroller—all elected biennially. A majority vote of each house is sufficient to overcome the governor's veto.

The legislature, termed the General Assembly, consists of a Senate and a House of Representatives. Members of each house are elected biennially. Legislative sessions are biennial.

The judiciary is made up of a Supreme Court of Errors with a chief justice and four associates; a Superior Court of eleven justices; Courts of Common Pleas; Justices of the Peace, and town, borough, police, and city courts.

Under the Reapportionment Act of 1911 Connecticut had five Representatives in the National Congress and gained one more in 1931.

Important measures enacted within recent years include creation of a public utilities commission; amending banking laws of the State; and reorganizing the State police department. Measures enacted 1937: create a Council to study legislative needs in advance of sessions; establish Civil service for State employees; and permit drinking at public bars.

The first English settlements were made by colonists from Massachusetts at Wethersfield (1634) and at Windsor and Hartford (1635). In 1636 there was a large influx of immigrants from Massachusetts, who were dissatisfied with the form of government in vogue in that colony. In 1637 a war was waged against the Pequot Indians by the settlers which practically exterminated the tribe. In 1639 the three towns of Wethersfield, Windsor, and Hartford drew up a democratic constitution for the colony of Connecticut, which remained in force until the granting of the royal charter by Charles II. in 1662.

At the close of the Revolution Connecticut claimed jurisdiction over part of the region north and west of the Ohio River in virtue of her old colonial charter.



The State was not in sympathy with the War of 1812 and was instrumental in calling the Hartford Convention. Consult Sanford's *History of Connecticut*; Steiner's *History of Education in Connecticut*; Douglas, *Government of the People in Connecticut* (1926); p. 1,606,903.

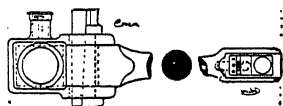
**Connecticut College**, an educational institution for women in New London, Conn., opened for instruction in 1915. The degrees of A.B. and B.S. are conferred. The college was originally endowed with a gift of \$1,250,000 by Morton F. Plant.

**Connecticut Lakes**, four small lakes in the extreme northern part of New Hampshire which are the source of the Connecticut River.

**Connecticut Reserve**. See **Western Reserve**.

**Connecticut River**, the largest river of New England, rises in New Hampshire, near the Canadian border, forms the entire boundary between Vermont and New Hampshire, and flows across Massachusetts and Connecticut to Long Island Sound, having followed a course of about 360 m. It is navigable by steamers to Hartford, at the head of tide water, a distance of 50 m. The scenery along its upper course is charming. Consult Bacon's *Connecticut River*.

**Connecting Rod** (of an engine), the rod which transmits the motion from the crosshead, at the end of the piston rod, to the crank pin. The term is also applied to rods



Connecting Rod.

performing a similar function in other machines. The figure shows a common form of connecting rod. The small end encircles a pin in the crosshead, and the larger end embraces the crank pin. The rod itself is of wrought iron or steel, and is provided with brasses at the ends. The wear of the brasses at the crank-pin end is taken up by a gib and cotter, and at the small end by a fine-threaded screw which works in a nut and presses against one of the brasses. The latter arrangement is not suitable, however, for large engines.

**Connective Tissue**, a body tissue of mesoblastic origin which supports and binds together the other tissues of the body and forms a framework for the organs.

**Connellsville**, city, Pennsylvania, is the

seat of a State hospital and State armory and one of the most important coke centers in the United States. The huge electric generating plant of the West Penn Power Company is situated here; p. 13,532.

**Connelly, Marc** (1890- ), American playwright, was born in McKeesport, Pa. He was co-author with George Kaufman of *Dukey*, *To the Ladies*, *Merton of the Movies*, *Beggar on Horseback*. *The Green Pastures* is perhaps the finest folk play in America.

**Conning Tower**, the circular or elliptical pilot house of a war vessel, heavily armored, with a narrow observation slit between the walls and the roof. It is the post from which, by means of telephone and speaking tubes, the commander directs a battle.

**Connolly, James Brendan** (1868- ), American author, was clerk, inspector, and surveyor with the U. S. Engineer Corps at Savannah; his books are chiefly sea tales, including *Deep Sea's Toll* (1905), *Out of Gloucester* (1902), and *Gloucester* (1930), and many others.

**Connor, Ralph**. See **Gordon, Charles W.**

**Connotation and Denotation**. By the *connotation* of a term is meant the sum of attributes commonly signified by it; by the *denotation* of a term, the sum of individuals or objects to which it may be applied. Thus, the term 'man' connotes the attributes rationality, mortality, etc., which must be possessed before the term man can be applied, and denotes the individual Socrates, Plato, etc. The simplest and most symmetrical usage seems to be that proper names, at the one extreme, have only denotation; general or common terms, as man, have both denotation and connotation; while mere attributes, as white, have only connotation. Consult works on Logic.

**Conodonts**, minute, hard, tooth-like fossils found in Silurian and Devonian rocks in many parts of the world; once regarded as teeth of fishes, but now believed to be the hard plates which covered the jaws of extinct species of worms.

**Conowingo Project**, a hydroelectric power development on the Susquehanna River, Maryland, virtually completed in 1930, at a cost of \$52,000,000. It comprises a 4,800-foot dam and power house at Conowingo, Maryland, and, with the exception of that at Niagara Falls, is the largest single hydroelectric plant in the United States. A highway bridge 105 ft. above the foundation serves as part of the main highway between Baltimore and Philadelphia.

**Conquest**, the acquisition of territory by

force, as by war, as distinguished from occupancy, or cession, as by treaty. See **INVASION**.

**Conquistadores** (Spanish, 'conquerors'), a title specially applied by the Spaniards to their great leaders who subdued the natives of Mexico, Peru, and other portions of Spanish America.

**Conrad I.**, German emperor, was chosen to fill the throne on the extinction of the line of Charlemagne by the death of Lewis the Child (911), the title emperor not being used at that period.

**Conrad II.** (c. 990-1039), king of Germany and emperor of the Romans, founder of the Franconian dynasty. In 1026 he was crowned king of Italy at Milan; the following year he received the imperial crown at Rome. In 1032 he added the duchy of Burgundy to the empire. He died in Germany in 1039.

**Conrad III.** (1093-1152), emperor of the Germans, founder of the Hohenstaufen dynasty, was the nephew of Henry v., who in 1115 made him Duke of the Franks. In 1138, the throne was offered to Conrad, and he was crowned at Aix-la-Chapelle. St. Bernard of Clairvaux had stirred the people to a new crusade to deliver Jerusalem, and in 1147 Conrad set off for Palestine with a large army. He lost the greater number of his soldiers and returned in 1149 broken in spirit. Three years later he died in Bamberg.

**Conrad IV.** (1228-54), emperor of Germany, of the house of Hohenstaufen, was the second son of the Emperor Frederick II. Elected king of the Romans (1237), he governed Germany during the long absence of his father in Italy, and after his death (1250) became emperor. Confronted with the enmity of the Pope, who excommunicated him, he was preparing to invade Germany at the head of a great army to reestablish his authority there, when he died of fever at Lavello.

**Conrad, Frederik Willem** (1769-1808), Dutch engineer, is remembered for the reclamation of great tracts of land from the sea, and for his masterly work in the reconstruction of the outlet of the Rhine.

**Conrad, Joseph** (1857-1924), English novelist, was born in the Ukraine, the son of a Polish squire, but in 1884 became a naturalized British subject. His parents being implicated in the Polish rising of 1862, his mother was sent to Siberia, and his father, editor of a patriotic review in Warsaw, died in prison. As a young boy, Conrad had a passion for the sea and much against his parents' wishes he went to sea, spending an eventful twenty years and acquiring an immense store of ex-

perience upon which he subsequently drew for his writing. *Youth* (1902) and *The Mirror of the Sea* (1906) contain descriptions of his early experiences as a sailor. Having mastered the English language, in 1889 Conrad began his first novel, *Almayer's Folly*, which was published in 1895. It at once attracted attention, and in a few years the author abandoned the sea, and settled in England to devote himself to literary work. In 1923 he paid his first and only visit to the United States.

Conrad's work is distinguished by a brilliant faculty of natural and psychological description. His style is remarkably vigorous and he was especially skillful in depicting the effect of Oriental influence upon Western character. By some critics he is considered the foremost English novelist of his time. His published works include, in addition to those already mentioned: *An Outcast of the Islands* (1886); *The Nigger of the Narcissus* (1897); *Lord Jim* (1900); *The Typhoon* (1903); *The Secret Agent* (1907); *A Set of Six* (1908); *'Twixt Land and Sea* (1912); *Within the Tides* (1916); *The Shadow Line* (1917); *The Arrow of Gold* (1919); *The Rover* (1923); *Under Western Eyes* (1923), *Last Essays* (1926). Consult F. M. Ford's *Joseph Conrad: A Personal Remembrance* (1924); A. Symons' *Notes on Joseph Conrad: With some unpublished letters* (1926); G. Jean-Aubry's *Joseph Conrad* (1927); R. Curle's *The Last Twelve Years of Joseph Conrad* (1928).

**Conrad, Michael Georg** (1846-1927), German writer, known as 'the foremost apostle of Zola.' He wrote several books on Parisian life and others including *Flammen* (1882); *Die Klugen Jungfrauen* (1889); *Von Zola bis Gerhart Hauptmann* (1902); *Wagner's Geist und Kunst in Bayreuth* (1906); *Emile Zola* (1906).

**Conrad, Robert Taylor** (1810-58), American lawyer and writer. He edited *Graham's Magazine* for several years, and engaged in newspaper work. He is best remembered for his tragedy, *Aylmere*, produced by Edwin Forrest, who played Jack Cade with great success.

**Conrad, Timothy Abbott** (1803-77), American palæontologist. His published works include: *American Marine Conchology* (1831); *New Fresh Water Shells of the United States* (1834); *Fossils of the Tertiary Formations of the United States* (1838). All of these books contained plates from his own drawings.

**Conradin of Swabia** (1252-68), the last of the Hohenstaufen dynasty, son of Conrad IV. His father died when he was but two years old, and Manfred, his father's half-brother, undertook to rule Naples and Sicily as king

during the minority of the young sovereign. He was opposed in this by the Pope, who offered the crown of the two Sicilies to Charles of Anjou. Charles proved a cruel and hated king, and Conradin, though only a boy of fifteen, was persuaded to attempt to recover his inheritance. He was received with great honor in Rome, but was subsequently defeated, taken prisoner, and executed at Naples by order of Charles. His brief but tragic career has supplied the theme for various writers of romance.



Courtesy Doubleday, Page & Co.  
Joseph Conrad

**Conrad von Wurzburg** (d. 1287), German poet, important for the great number and variety of his works, for the purity and elegance of his language, and for the correctness of his versification. His longest work is the unfinished *Der Trojanische Krieg*, containing about 40,000 verses. Other important works are *Die Goldene Schmiede*, a religious work celebrating the Holy Virgin; *Engelhart und Engeltrut*, a delightful story of friendship. Consult Grimm's introduction to *Die Goldene Schmiede*.

**Conried, Heinrich** (1855-1909), German-American impresario, was born in Austrian Silesia. After attaining success as an actor in his native land, he came to New York in 1878. In 1892 he assumed the management of the Irving Place Theatre, in New York, where he formed a stock company for the presentation of German drama. From 1903 to 1908 he was manager of the Metropolitan Opera House.

**Consalvi, Ercole, Marchese** (1757-1824), Italian cardinal and secretary of state, although he was not a priest, and never became one. In 1801 he went to Paris, where he successfully concluded the Concordat with Napoleon. He was sent to the Congress of Vienna

(1815), where, as the Pope's delegate, he succeeded in recovering the Papal States. He introduced many reforms, such as a new civil and commercial code of laws, a reorganization of the administration, and the suppression of brigandage.

**Consanguinity**, signifies relationship by blood, as contrasted with affinity, or the relationship created by marriage. It is of two kinds—lineal, or the relationship existing between an ancestor and a descendant in a direct line; and collateral, or the relationship existing between those who are descended from a common ancestor, but not in the same line or branch of the family, and who, therefore, do not bear the relation of ancestor and descendant to each other. Consult Lang and Atkinson's *Social Origin and Primal Law*.

**Conscience.** In any community there is a generally accepted standard of right and wrong—a set of moral judgments accepted without question as binding by most members of the community. This moral standard as an operative content in the mind of any member of the community is called 'conscience.' When the individual's conscience is in advance of that generally accepted, it is said to be 'enlightened.' When, in consequence of repeated transgressions of the accepted standard, its hold over him is relaxed, it is said to be 'blunted.' If the individual judges himself to have transgressed his moral standard, he feels remorse. If he judges himself to have acted up to it, he is free from this pain, or has a certain pleasure of self-approval.

The classical exposition of the place of conscience in human nature is set forth by Joseph Butler, the English theologian, in his *Three Sermons on Human Nature*. For the views of later intuitionists, consult H. Sidgwick's *History of Ethics* (ch. iv.), with the works therein mentioned; Calderwood's *Handbook of Moral Philosophy*.

**Conscience, Hendrik** (1812-83), the most famous of Flemish novelists, and one of the originators of the popular literary Flemish movement, was born in Antwerp. His first notable literary success was the historical novel, *De Leeuw van Vlaenderen* (1838). This was followed by other books in the same field. His finest achievements are his studies of Flemish domestic life, in which a touch of pathos gives depth to his characterization. His skill in this genre is well illustrated in his little stories.

Conscience's one-hundredth volume was published in 1881. A collected edition of his works has appeared in 10 volumes. Most of

his work has been translated into French and German; English translations include *Fashion*, *The Lion of Flanders*, *The Merchant of Antwerp*, *Summer Evening Tales*, *Tales of Flanders*, and *The Young Doctor*.

**Conscience Money**, money voluntarily paid, to assuage the conscience, by one who has evaded an obligation, such as a tax or a debt. The British Treasury always acknowledges receipt of such money in *The Times*.

**Conscience Whigs**, those members of the Whig party in Massachusetts who refused to accept the Compromise Measures of 1850 as a final settlement of the slavery controversy.

**Consciousness**. To be 'conscious' is to be mentally awake or active, in contrast with the 'unconsciousness' of dreamless sleep, or that produced by an injury to the brain. Consciousness is the term used, either abstractly to signify the quality of being conscious, as when we speak of states of consciousness; or concretely, to signify that whole stream of such states in which the waking life of a man (or any other conscious subject) consists. The meaning of the word consciousness has been variously analyzed but usually the definitions of the word are vague. The man on the street uses the term and knows what he means by it, but the psychologist has surrounded it with so many metaphysical connotations that Watson and other behaviorists have discarded the term entirely. The laboratory observations of the behavior psychologists upon the overt behavior of new born and older infants, and the clinical observations of the psychoanalysts upon the behavior of maladjusted adults has changed the connotations of consciousness for the professional person. For laymen no substitute for the word consciousness has been found. See **PSYCHOLOGY**; **PERSONALITY**; **UNCONSCIOUS**; **UNCONSCIOUSNESS**. Consult William James' *Principles of Psychology* (1910); Watson's *Behaviorism* (1930); *Psychologies of 1930*, by Clark University Press.

**Conscription**, formerly used to designate the enrollment of men selected by lot for compulsory military or naval service, is now also applied to the enrollment of all male citizens of certain ages for the purpose of enforcing nation-wide compulsory service. In the nations of antiquity the nobles or chiefs were usually called upon to furnish quotas when an army was to be raised. In Athens, the system resembled that of modern Europe, with its active army and reserves; while Sparta kept in constant training its entire male population of military age. In the early days of Rome, her

army was also provided through universal military service.

In Greece, the justification of compulsory service was based upon the duty of every citizen to the state of which he was a part; in most monarchical states it rested upon allegiance to the crown. The republican idea was exemplified in the Acts of the Continental Congress, in the Constitution of the United States, and in the Act of Congress of 1792 'to provide for the national defence by establishing a uniform militia throughout the United States' by 'enrolling every free able-bodied white male citizen of the respective States' between the ages of 18 and 45 years.

The real foundation of the modern European system was laid in Prussia by the Law of 1808, which was based on the French model, but which permitted no exemption through distinction of class or by purchase. After 1815 the full development of the system achieved very important results. It fused the nation, bringing together recruits from all parts—the classes and the masses; it brought about universal education, which was introduced as a military measure; it was of much assistance in the founding of national industries. The money borrowed and spent to carry out compulsory service and education in the years following Napoleon's downfall steadied and supported national finance; the care of the health of recruits and their hygienic instruction is said to have greatly improved their bodily condition throughout life, and to have added an average of five years to its duration; and, lastly, the possession of such a military establishment relieved the nation from all fear of foreign aggression.

The remarkable success of the Prussian army in 1866 and of the German army in 1870 caused most of the nations of Europe to adopt some modification of the Prussian system. While the details differ somewhat in each country, the general features of military service (except in Switzerland) are similar to those of Germany. The chief feature is that every young man upon reaching a certain age must take his place in the ranks and receive military training for a period of years.

Conscription in the United States was resorted to in the American Revolution and in the Civil War. It was apparent in both these wars that the government could not rely upon the volunteering of a sufficient number of men and that paid soldiers were usually of an undesirable type. In the Civil War a man might escape conscription by furnishing an accept-

able substitute or by the payment of a sum for securing such substitute; hence the exemption was known as 'The Rich Man's Exemption.'

Soon after the United States entered the World War, Congress passed a conscription bill which was amended subsequently to extend the age limit, from 18 to 45.

In 1940, for the first time in the history of the country, peacetime conscription was inaugurated. Men between 21 and 35 were called for one year. In 1942 men from 20 to 44 were registered, and in 1943, men between 18 and 45.

After World War I both Italy and Russia made use of the principle of conscription in carrying out their economic programs.

During World War Draft Treaties were entered into by the United States and Allies, whereby men of draft age residing in an allied country might be drafted into the army of that country if they did not return, within a prescribed period, to their own country. Thus, an American, subject to draft and residing in England, might register there, and if his number was drawn, join an American training camp either in England or in France. Failing to do this, he was subject to British conscription. Similarly a British subject liable to conscription might be drafted into the U. S. Army upon failure to return for service to Great Britain.

A special agreement was made between the United States and Canada, with reciprocal provisions practically identical with those in the treaty with England. The treaties with Great Britain and Canada were finally ratified July 30, 1918. It has been estimated that they affected 54,000 Americans, including 36,000 in Canada; 250,000 British and 60,000 Canadians in the United States were also affected. Similar treaties were in force between the United States and France, Italy, and Greece. See ARMY; MILITARY AGE; MOBILIZATION; EUROPE, GREAT WAR OF; HOME RULE.

**Consecration** is the formal dedication of something to God. The belief that places, things, and persons can be made sacred belongs to primitive religion, and is found in some form, in all religions.

Among Christians the word consecration describes—1. the ordination of bishops. 2. The hallowing of the elements in the eucharist, by the words of institution, according to Roman Catholics and Anglicans; by the invocation of the Holy Spirit, according to the Greeks. 3. The dedication of churches. 4. The benediction of abbots and abbesses according

to forms prescribed in the Roman Pontifical. 5. The consecration of altars, chalices, and patens by the bishop with or without the chrism or hallowed oil.

**Consecutive**, in music, is a term applied to recurring intervals, especially fifths and octaves. The rules of harmony forbid consecutive octaves and perfect fifths in part writing, though there are exceptions in modern music.

**Consent**, in the law of obligations, denotes a free and deliberate intention of undertaking a legal duty. Consent may be disproved by evidence that the party bound was incapable of understanding the nature of the transaction or of appreciating its effects on account of extreme youth or mental infirmity, or that he was laboring under an essential error, or was the victim of a fraud, or that he was compelled by force or threats to comply with another's wishes.

**Conservation Movement.** A phrase recently brought into general use to express foresight, restraint, and social or governmental control in the exploitation of the natural resources of wealth as necessary for the perpetuity of civilization, and the welfare of present and future generations; also the measures necessary to secure such foresight and restraint. With the advance of population and civilization the rate at which man uses up the resources of the earth has increased.

Some of the natural resources and the status of their exploitation are discussed below. In some cases, as that of ore deposits, these are fixed in amount, and use decreases them; while in others, as in that of timber, they are continually renewed, and their decrease or increase depends on the rate of use. In a third class, represented by water power, the resource is not an accumulation, but is supplied at a fairly uniform rate, and must be used at this rate or let go to waste, storage being possible only to a limited extent.

Soil is not a fixed resource, as it is constantly renewed by the action of air, water, and plant growth on the rocks of the earth's crust. Tillage, however, may both use it up and waste it much faster than it can be made. Crops take away the soluble minerals, which have to be replaced by fertilization, and the rains wash the soil into the rivers, which carry it seaward. The immediately arable land throughout the world has been largely occupied; but unavailable land is being made available by deforestation, irrigation, and drainage. Intensive methods of cultivation, also, may greatly increase the yield even of fertile fields.

The water as a source of food has been little

drawn upon. Fish will be eaten more and more as population increases; the supply, already large, can be increased by propagation, and the quality improved by breeding.

The problems of fuels and of sources of power are in reality one. The use of the former to raise temperature is only a special case of power utilization. Water power was not largely developed until the present generation. In connection with electric power transmission, it is now playing a large part in the world's industrial life, and is destined to play a still larger part; for, like the winds, it is continually renewed, only its rate of availability being limited. The great water powers of the earth have hardly begun to be utilized. Tidal power, like wind power, is too irregular for use in large electric plants, but may some day be made available through a perfected storage battery. Experiment has also been made with wave motors; but these simply utilize wind power through an intermediate agency.

Fuel power is dependent on accumulations in great forests, beds of peat and coal, and deposits of petroleum and natural gas, which are gradually being exhausted. Firewood still makes up one-fifth of the value and more than one-half of the volume of forest products in the United States. Peat exists in vast deposits which are destined to be of great use. All fuels, however, are but temporary sources of power.

In many cases, the use of a substance is entirely modern. In the 17th century, except precious stones, the list of substances dug from the earth by man was limited to clay, abrasives, iron, copper, and five or six other metals, sand, mica, salt, peat, and coal. To-day, several hundred substances are similarly obtained, some of them now considered of far greater importance than any of those mentioned. Some—such as sulphur—are continually being renewed from the bowels of the earth. Others are exhaustible and rapidly giving out. Some metals—tin, for instance—may become unknown in less than a hundred years. We must apparently look for substitutes for iron and copper. Aluminum seems to be the most promising substitute; it exists everywhere in common clay, but has not yet been extracted from this source for commercial purposes. It is possible that vast ore deposits may lie hidden in the depths of the earth's crust, and in the frozen arctic and antarctic regions, and that methods may be devised for reaching them. It should be remembered that use does not annihilate any metal, but only renders it un-

available by scattering it in infinitesimal particles. Methods of recovering these may be found.

Forests constitute a self-renewing resource, like the food crops, and are now chiefly valuable for materials of construction. In America they are being used up faster than they can be renewed, and renewal is hindered by the wasteful way in which the timber is gathered. Instead of making the forest a constant source of timber and revenue, as in many parts of Europe, it has been generally cut off all at once in such a way that no useful crop is likely to take its place. The adoption of scientific methods of forestry is remedying this. See FORESTRY.

Rivers as trade routes were formerly of high importance. Conservation will doubtless restore much of their value, through deepening of channels by dredging, or by damming to create successive slack-water pools, with incidental development of water power; and through equalization of flow by forestation and storage, with proportionate decrease of flood losses and increase of water power. It may here be noted that, generally speaking, the conservation of water for potation, transportation, sewerage, and power alike require uniformity of flow; but for irrigation in a temperate climate the flow should be concentrated in the growing season. The orderly adjustment of these conflicting needs should be the aim of public policy. Canals should be considered as connecting links in the system of natural waterways.

Wild animals injurious to man will doubtless be systematically destroyed. Some domestic animals, useful in the past as power sources, will largely lose such usefulness. Others, preserved for food, such as cattle, sheep, swine, fowls, etc., must be fed, and the problem of their food supply is the same as that of man's. Æsthetic and scientific motives will insure the preservation of many wild species in refuges, where primal geographical conditions may also be artificially perpetuated behind legal barriers. The lingering fondness of man for the ancient sports of hunting and fishing, and the commercial values of many wild animals and birds for furs, food supply, will conserve the untamed life of the earth. Conservation has been briefly and pithily defined to be 'utilization with maximum efficiency and minimum waste.' It means 'the greatest good to the greatest number for the longest time.'

The natural resources that are the subject of conservation—the forests, the streams, the soil, the wild life, and the minerals—are mu-

tually interdependent. Waste or conservation of one of them begets waste or conservation of the others. Utilization of water power means delayed exhaustion of coal, peat, firewood, and fuel oil. Larger production of aluminum means lesser need of tin; larger use of asphalt, lesser need of wood; and so on. Enlargement and preservation of forests, planting of wood lots, and lining of highways with trees increase stream flow and provide wild life refuges. Birds that come to live in planted groves and orchards befriend the trees and other plants by devouring the insects that harm and destroy them.

A calamity involving widespread destruction of one species influences other species favorably or unfavorably. Man himself is within the law. War's waste of human life and cessation of trade and intercourse affect not only all mankind, near and remote, but plant, animal, and mineral resources, close at hand and far away. When forty thousand foresters fight each other across the trenches, forestation ceases, and gunfire mows down not only the foresters, but their carefully cultivated groves. The cutting off of trade lessens the demand for furs from the Canadian Northwest and fish from the Newfoundland Banks. The loss of potash imports from Germany develops kelp harvesting along the shores of California; and the cutting of the kelp in turn produces problems not only of its own conservation, but of the preservation of bathing beaches and the protection of marine fishes. These are but two or three instances in a thousand of the relation of war to conservation.

The conservation movement, like the movements for better public highways, better service of public utilities, better public health, and better labor conditions, is social in nature. It is a reaction against the century-old policy of the United States that has freely given away vast public domains to individuals and corporations. It is a protest and a struggle against a rapidly growing monopolistic absorption and exploitation of the country's natural resources by powerful and unscrupulous private combinations. Its primary aim is continued and enlarged public ownership as opposed to private ownership; its secondary aim is greater public control and limitation of private proprietary rights.

The conception of an organized movement to coordinate all forces for the systematic conservation of the natural resources of the United States first took practical form under President Roosevelt in 1908, growing out of the movement for conserving forests. Mr. Gifford

Pinchot probably exerted more influence than any other person in the general movement. The conservation measures of the Roosevelt administration were based upon the need for rational public control of natural resources—by the Federal Government where ownership of the public lands or control of navigable rivers gave it jurisdiction; by the State governments where private property must be regulated through the exercise of the general 'police power.'

President Roosevelt created the *National Conservation Commission*, consisting of forty-nine well-known publicists, scientists, and industrial leaders. In 1908 and 1909 more than ninety similar commissions were appointed by governors of States and national societies. The National Commission, assisted by expert Federal officials, made an inventory of the nation's resources. Its functions were taken over by the *National Conservation Association*, supplemented by the *National Conservation Congress* as a forum for annual public discussion. On the invitation of President Roosevelt, delegates of the United States, Canada (with Newfoundland), and Mexico met at Washington on Feb. 18, 1909, and adopted a comprehensive declaration of principles.

The conservation measures and propaganda of the Roosevelt administration aroused the hostility of many private interests, and the opposition of certain Government officials and bureaus. However, other national organizations devoted to special lines of conservation or to occupations affected by it have been helping powerfully to shape the movement. All of these bodies hold annual meetings, and publish *Proceedings*. Some of them maintain regular monthly publications and distribute free propagandist literature.

On the side of conservation should be mentioned the growing work of numerous schools of forestry, mining, engineering, biology, chemistry, agriculture, and other conservation sciences in American universities. The National Educators' Conservation Society, a new association organized in 1916, aims to teach children to protect forests and wild life. An interest in conservation is part of the training of the Boy Scouts of America. The arbor days and bird days observed in the schools of various States are educational in character.

Parallel with this widespread influence of voluntary societies and institutions of learning is the mightier practical work of Federal and State administrative officers, boards, and commissions under growing legislative interest in Federal and State resources. Long before the

historic conservation conference of 1908 there were Federal Departments of the Interior and of Agriculture charged with conservation duties. The important work of the U. S. Geological Survey, begun in 1879, has been in progress on an increasing scale ever since. Likewise, the States had their administrative fish and game departments, forestry boards, geologists, and other like functionaries. These, if nothing else, had been laying broad foundations of knowledge as a basis for conservation surveys and work. The national conservation movement put new life into them, increased their number, and charged them with genuine and important conservation tasks.

The question of the conservation of oil has received much attention in recent years, furnishing an example of the seriousness of the problem of government reservation of its necessary resources. In 1927-28 the government was obliged to cancel certain leases made to individuals, on oil lands, as a result of the famous trials connected with the Teapot Dome affair.

The chief accomplishments in the past 20 years are reforestation in many areas, not only as an increment in timber supply but as a protection to river sources and a preventive of soil erosion; the building of railroads in Alaska to facilitate development of resources; and a more adequate administration of the whole conservation movement.

A specific example of recent work in conservation is furnished by New York State whose powerful Conservation Commission operates under four divisions: Lands and Forests; Fish and Games; Water Power and Control; and Parks. The State has planted thousands of acres of land with trees, as part of a 15-year reforestation program. The number of trees planted reaches into hundreds of thousands. The State is engaged in a biological survey of all its waters to determine their capacity for supporting fish. There are fish hatcheries for replenishing the stock. There are facilities for protecting State forests from fire and disease. The State Museum conducts surveys of natural resources and their relation to industry, and a survey of plant and animal life, publishing reports, popular and technical.

See FORESTRY; INLAND WATERWAYS; IRRIGATION; RECLAMATION OF LAND; WATER POWER; FUELS. Consult Inland Waterways Commission's *Report* (1908); *Proceedings of the White House Conference* (1908); National Conservation Commission's *Report* (3 vols.,

1909); Pinchot's *Fight for Conservation* (1910); Van Hise's *Conservation of Natural Resources in the United States* (1910).

The annual reports and occasional bulletins of the U. S. Department of the Interior, of State conservation commissions, and of other State commissions, boards, or officials charged with conservation interests are especially in point. The latest State documents may be readily known and located by means of the *Monthly List of State Publications*, issued by the Congressional Library. The Canadian Commission issues a monthly bulletin, *Conservation*. The annual volumes of the *American Year Book* record current progress.

**Conservation of Energy.** See **Conservation of Matter.**

**Conservation of Matter.** The axiom that the matter in the visible universe, as measured by its weight or mass, is invariable in amount, is the foundation of the science of chemistry. It is also implicitly assumed in all affairs of life. In other words, matter, however much it may alter its appearance and many of its physical and chemical properties, can neither be destroyed nor created, but remains conserved throughout all its changes. When water evaporates it appears to lose in weight; but if the steam, instead of being allowed to escape, is weighed with the water, there is found to be no loss in weight at all. When a candle burns, it appears to lose in weight, but that is simply because the products of combustion are allowed to escape. Though no particular experiments can demonstrate the universality of this generalization, its validity has a strong confirmation in the fact that since historical times the length of the year has not varied, showing that, in spite of the enormous chemical changes that have taken place in the earth and sun, their masses have not appreciably altered.

Within the last eighty years another similar principle, known as the Conservation of Energy, has come to the front; and although the apprehension of its significance is more difficult than in the case of the conservation of matter, its recognition and application all through the sciences has been among the most important factors in the progress of recent thought. Every change which takes place in the visible universe means a transformation of energy from one form into another, but it is simply a transformation without any destruction or creation of energy. The principle unifies in a remarkable way all the activities of the world we live in. No scientific observation has ever



been made inconsistent with its truth; and its value as a guide in research has been repeatedly demonstrated in the recent advances of science. See ENERGY; THERMODYNAMICS.

**Conservative.** See **Tory**.

**Conservative Brethren.** See **Dunkards**.

**Conservatory** (mediaeval Latin *conservatorium*, Italian *conservatorio*, French *conservatoire*), a school for the cultivation of music and its allied branches. Originally, in Europe, the conservatory was an asylum wherein poor and orphaned children were taught music; later, paying outside students were also admitted. Vocal and instrumental music, declamation, and modern singing languages are taught in present-day conservatories, while a few give general culture courses.

Naples, the birthplace of the conservatory, possessed a noted school for music as early as 1496, and three others by 1600, all for boys only. That of Sant' Onofrio is most famed, on account of its great teachers, A. Scarlatti, Durante, Leo, and Porpora. Venice also had four of the earliest conservatories, all for girls; with the death of the republic these were suspended.

The leading music school of the world is the Paris Conservatoire, with eight affiliated bodies in French cities. Admission is by competitive examination, and the teaching is gratis. Its *Prix de Rome*, giving three years' study in Italy, is the grand hope of every student, and has been won by nearly all important French composers, most of whom later became professors at the Conservatoire. Its foundation as an opera singers' school in 1784 was by Sarette, who became its first director.

In 1843 Mendelssohn and Schumann established in Leipzig a Conservatorium primarily instrumental, all others being primarily vocal. It was long the Mecca of students, and a model for other such schools; among many renowned directors were Moscheles and Reinecke. The oldest of such schools in Central Europe, however, is at Prague (1810). Most of the leading cities of Europe have good conservatories. For example, Leningrad's (1862) is illustrious for a line of world-famed teachers, including Rubinstein, Wieniawski, and Tschaiikovsky.

The great musical uplift in the United States began just after the Civil War. The New England Conservatory of Music in Boston and the Chicago College of Music both date from 1867; Peabody Conservatory in Baltimore from 1868; the Cincinnati College of Music from 1878. In New York City, the National Conservatory of Music (a corporation), of 1885, had Dvorak for its head; best endowed in the

country is the Institute of Musical Art (1905); the noted Guilman organ school was begun in 1898; and the Juilliard Musical Foundation in New York (1920).

**Conservatory**, in horticulture, as generally understood, is a glass house set apart for the display of plants, rather than for their propagation and continuous culture. See GREENHOUSE.

**Considérant, Victor Prosper** (1808-93), French socialist. Early becoming imbued with the socialistic doctrines of Fourier, he quitted the army (1830), and founded several Socialist colonies, all unsuccessful. In 1848 he was elected to the National Assembly, but was accused of high treason, and compelled to flee to Belgium, and afterward to the United States. Here he founded La Réunion community, near San Antonio, Tex.; but the Civil War ruined it, and Considérant returned to France. Among his works are: *Destinée Sociale* (1851); *Manifeste de l'Ecole Socialiste Fondée par Fourier* (1841); *Principes du Socialisme* (1847). Two of his works—*The Last War* and *The Difficulty Solved*—have been translated into English.

**Consideration**, in law, may be described in general terms as the return which one party makes for a promise given in his favor by the other. It is a fundamental rule of the common law that no gratuitous promise is, with but one exception, binding and enforceable. The exception is that at common law promises under seal are binding, though no consideration be received by the promiser.

The question as to what constitutes a sufficient consideration is one which has been worked out in the greatest detail by the American and English courts. Two main rules may be given: 1. The consideration must be real and of some value. Neither 'moral duty' nor 'natural affection,' nor anything of a like nature can constitute a valid consideration. Similarly, it is no consideration for a person to promise what he is already legally bound to do; nor again can a past act be raked up to form the consideration for a new contract. 2. It is not necessary that the consideration should be equivalent in value to the promise; the court will not measure the adequateness of the return. It need hardly be said that nothing illegal or immoral can constitute a valid consideration. If A promise to pay B \$1,000 in return for a promise of his to deliver certain goods at a future date, or not to object to a future infringement of his copyright, B's promise is the consideration for A's. See CONTRACT.

**Consignment**, in the wider sense, denotes the delivery of goods to a carrier for transmission to a party in another place; this use of the word is most common in the case of over-sea transit. In the narrow sense, the word means the delivery of goods to a mercantile agent or factor for the special purpose of being sold by him at the best advantage.

**Consistory** (Latin *consistorium*), properly a place of assembly, but particularly applied to the privy council or cabinet of the Roman emperor. The form of the imperial consistory passed into the Christian Church. In the Roman Catholic Church the word is almost solely used in connection with the *Papal Consistory*, in which the pope presides over the college of cardinals. In England the word is used to denote the spiritual court.

**Console**, in architecture, is a projecting stone, resembling a bracket, employed in the dressing of apertures. It flanks and seems to support the weight of the cornice and architrave, and is finished in the form of a scroll. It is a familiar feature of the richer orders. The term is also applied to a table made to sit against a wall.

**Consolidation Act** is a statute which collects and arranges in orderly form all previous enactments dealing with a specific subject. See CODE; STATUTES.

**Consols**, a contracted form of Consolidated Annuities, constitute the main portion of the British national debt. Between 1750 and 1757 several acts were passed consolidating different kinds of stocks into joint stocks of annuities, the greater part of which bore interest at 3 per cent., though some were at a higher rate.

**Consonance** is a combination of notes which can sound together without the harshness produced by beats. See SOUND; MUSIC.

**Consonant**. See ALPHABET; PHONETICS.

**Consort** is the name given in Great Britain to the wife or husband of a reigning king or queen. A queen consort, or wife of a reigning king, is always a subject of her husband, though she is entitled to certain privileges. Practice has varied with regard to the husband of a reigning queen. To Prince Albert of Saxe-Coburg, the husband of Queen Victoria, special precedent was accorded after the Queen, and in 1857 he received the title of Prince Consort.

**Conspiracy** may be defined as 'an agreement of two or more to do an unlawful act or to do a lawful act by unlawful means.' It is the agreement that constitutes the offence, and the fact that the purpose has not been carried into effect is immaterial. A plurality

of persons is essential, and it is further necessary that they should have a single and united aim differentiating them from mere joint delinquents. Thus, if two persons agree that on a certain day they will take a walk together over another person's land, they could not be called conspirators, because the carrying out of their intention would nowise differ in nature and result from a separate trespass by each alone. But if their object in going together was to overpower the owner of the land, should he attempt to maintain his legal rights, then they might be regarded as conspirators.

In modern times the question has chiefly attracted attention in connection with trade disputes. The judges formerly took the view that all combinations of employees or workmen, especially of the latter where the purpose was to raise wages, were conspiracies in restraint of trade. The law in the United States is such that trade unions, employers' federations, strikes, and lockouts cannot be attacked or prevented on the ground of conspiracy.

**Constable**, (Latin *constabulus*), the title of an ancient officer, originally of high military rank, but now generally an officer of the peace. Under Napoleon, the constable was the fifth of the great dignitaries of the empire. The high constable of England appears shortly after the Conquest as the seventh great officer of the crown. In 1521, the office became forfeit, and has never since been granted except for a special ceremony of state. For the police constable, see POLICE.

**Constable, Archibald** (1774-1827), Scottish publisher, came first into prominence as the publisher of the *Edinburgh Review* (1802), whose contributors he paid at the then unheard-of rate of twenty-five guineas per sheet. He had a share in the publication of Sir Walter Scott's *Minstrelsy of the Scottish Border* and the *Lay of the Last Minstrel*; and published the greater part of Scott's novels. In 1812 the firm (Constable & Co.) bought the copyright and stock of the *Encyclopædia Britannica*. In 1826 the failure of their London agents involved Constable and his partner in bankruptcy. His last publication was his *Miscellany*, begun in 1827. Consult his *Life* by his son.

**Constable, John** (1776-1837), English landscape painter and leader of modern art, the son of a miller, was born in Suffolk, where he had opportunities of watching the movement of clouds, changes of wind, and play of light on water and foliage, and where he sketched them assiduously. Entering the Royal Academy schools (1799), he tried his

hand at portraiture and historical pictures. A careful study of Ruysdael, however, decided the young painter to go back to his village and study from nature only; and all Constable's work testifies to his passionate, direct, and investigating temperament. In 1821 he had great success with his *Hay-wain*, exhibited in the Paris Salon as also by his *White Horse*, at the Lille Exhibition in 1825. Each work gained a gold medal, and the former won the enthusiasm of Delacroix.

The art of Constable marks the first definite departure in the history of English landscape from the conventional treatment of the earlier painters, and the return to direct and personal impressions of nature. The National Gallery has eighteen of his pictures, among them *The Valley Farm*, *The Corn-field*, and *The Hay-wain*; South Kensington Museum has eleven, including *Salisbury Cathedral and Hampstead Heath*, besides some 400 sketches. He is represented in the Metropolitan Museum, New York, by *Bridge on the Stour* and *The White Horse*. Consult Leslie's *Memoirs of the Life of Constable*; Holmes' *Constable*, and *His Influence on Landscape Painting*; Ruskin's *Modern Painters*.

**Constance, Council of**, an ecclesiastical council (1414-18) held at Constance, called by Pope John XXIII. at the instigation of the Emperor Sigismund. Sigismund, Pope John XXIII., representatives from all the monarchs of Catholic Christendom, as well as dignitaries of the church and state attended, and action in many directions was taken. Religious unity was restored to Europe, but the authority of the pope was not diminished, and no effective reform was instituted. Consult Creighton's *History of the Papacy during the Reformation*.

**Constance, Lake** (anc. *Brigantinus Lacus*; Ger. *Bodensee*), a lake formed by the expansion of the river Rhine at the north base of the Alps, 1,306 ft. above sea-level, touching Switzerland, Austria, and Germany. Bregenz, Lindau, Friedrichshafen, Constance (from which the lake is named), and Arbon are the chief towns on its shores.

**Constans I.** (321-350 A.D.), the youngest son of Constantine the Great and Fausta. At the death of his father (337 A.D.) he became, with his two brothers, Emperor. His brother Constantine treacherously attacked him but was killed, and Constans became sole Emperor of the West (340), and abandoned himself to licentious indulgence. In 350 he was killed by the cavalry of a usurper to the throne.

**Constant, Jean Joseph Benjamin** (1845-1902), French painter and writer on art, ex-

hibited early in the Paris Salon and his *Hamlet* was bought by the French government in 1869. During travels in Spain and Morocco he began to paint Oriental subjects with sensuousness of feeling and color worked with heavy *impasto*, such as his *Prisoners of Morocco*, 1878 (Bordeaux Museum). His later work consists largely of mural decorations and portraits. His portraits include one of Queen Victoria. A large mural painting, *Justinian in Council*, is in the Metropolitan Museum of Art, New York. Other works are: *Samson and Delila* (1872); *Mohammed II.* (1876); *Le Jour des Funérailles* (1889). Consult Strahan's *Modern French Painters*.

**Constanta, Constantza, or Kustenji**, town and seaport in Roumania, is situated on the Black Sea at the eastern end of Trajan's Wall. It has a good harbor, and is important commercially; p. 27,662.

**Constant de Rebecque, Henri Benjamin** (1767-1830), French author and politician, was banished from France (1802) for having denounced the despotic acts of Napoleon, and went to Germany, where he came in contact with Goethe and Schiller. On Napoleon's fall in 1814 he returned to Paris, and during the Hundred Days was one of Napoleon's counselors of state. Among his friends were Madame de Stael, Talleyrand, Gibbon and Kant. His political pamphlets were collected under the title of *Cours de Politique Constitutionnelle* (1817-20); his *Discours* were published in 1828, and he wrote also *De la Religion* (1824-30); a remarkable novel, *Adolphe* (1816); *Ouvrages Politiques* (1875); *Journal Intime* (1894). Consult *Life* by Ricard.

**Constantine** (Ar. *Ksentina*), town, Northern Algeria, Africa, capital of the province of Constantine. It is situated at an altitude of 2,100 ft. on a rock entirely isolated on three sides by the deep and narrow ravine in which the Rummel flows. The situation of the town is most picturesque, but hinders its development. Constantine (the ancient Cirta) was the capital of Massinissa; Cæsar established the Roman colony, and Constantine the Great rebuilt the city in 312. It was taken by the French, in 1837; p. 78,220.

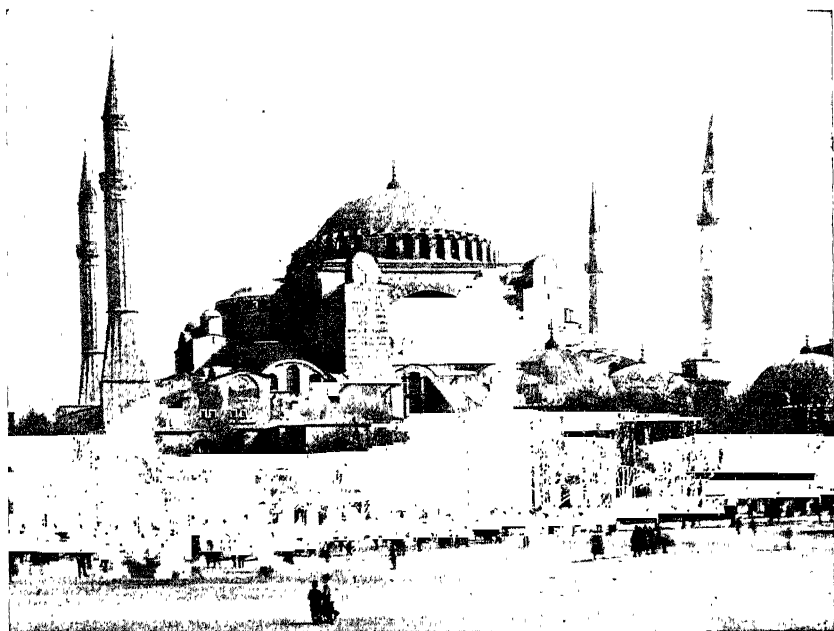
**Constantine, or Constantinus**, the name of thirteen emperors of Rome, of whom all but the first two were rulers only of the East. The most noteworthy are:

*Constantine the Great* (272-337 A.D.), Flavius Valerius Aurelius Constantinus Magnus, son of the Emperor Constantius Chlorus and Helena, succeeded to the throne when his father died (306 A.D.), but at first held only the countries

beyond the Alps. His victory over Maxentius, in 312, gave him possession of Italy; and his subsequent defeat (323) of Licinius, left him sole ruler of the whole empire. It was during the former campaign that he is said to have seen the cross in a vision, with the words, 'By this conquer,' and so to have been converted to Christianity. In 330 he founded Constantinople, and made it the capital of the empire. He introduced a new system into the Roman empire, dividing the military from the civil administration. Consult Gibbon's *Decline and Fall*; Firth's *Constantine the Great*.

*Constantine XIII.*, Palæologus (1394-1453 A.D.), surnamed Dragases, the last emperor of the East, reigned from 1448 to 1453. In his day, all that remained of the empire was the city of Constantinople, with a few coast towns and islands in Greece. The end came when the Turkish sultan Mohammed besieged Constantinople, and the emperor was cut down by the Turks.

*Constantine I.* (1868-1923), King of Greece, the eldest son of King George I. and Olga, niece of Nicholas I. of Russia, was educated by German tutors for a military career.



*Santa Sophia, Constantinople. (Photo by Publishers Photo Service).*

*Constantine II.*, Flavius Claudius (312-40 A.D.), Constantine the Younger, son of Constantine the Great, emperor from 337 to 340. He governed Gaul, Britain, Spain, and part of Africa. In a war against his brother Constans to obtain the rest of Africa and Italy, he fell in battle.

*Constantine VII.*, Flavius Porphyrogenitus (905-59 A.D.), the only son of Leo VI. and Zoe. His surname means 'born in the purple,' and was given him because born in the purple chamber in which the empresses awaited their confinement. He is best known as an author having left books on the *Administration of the Empire*, on *Tactics*, on *Strategy*, and on the *Ceremonies of the Byzantine Court*.

In 1889 he married Princess Sophia, sister of Wilhelm II. of Germany. He commanded the Greek forces in the Turkish War of 1897 and was severely criticized for the Greek failure, but in the Balkan War of 1912-13 was acclaimed a national hero. Upon the assassination of his father, in March, 1913, he ascended the throne and greatly enlarged the area of his sovereignty. Because of his alleged German sympathies during the Great War he was forced to abdicate. Constantine was recalled in 1920. Civil and military revolts caused his second abdication (1922) and his retirement to Sicily, where he died.

*Constantine*, or *Flavius Claudius Constantinus*, a British soldier who in 407 A.D.

was chosen emperor by his comrades, in rivalry to Honorius. He was subsequently forced to surrender to Constantius, the general of Honorius, and was executed by Honorius.

**Constantine, Nikolaevitch** (1827-92), grand-duke of Russia, second son of the emperor Nicholas I., and brother of Alexander II. On the outbreak of the Polish insurrection (1862), he became viceroy of Poland, was appointed in 1865 and reappointed in 1878 president of the council of the empire. After the accession of his nephew, Alexander III. (1881), he was deprived of his offices on suspicion of having intrigued with the revolutionary party.

**Constantine, Pavlovitch** (1779-1831), grand duke of Russia, second son of Paul I. Appointed generalissimo in Poland (1815), he effected reforms with arbitrary severity, till the revolution of 1830 led to his banishment to Bielostok by his younger brother, the Czar Nicholas I., in whose favor he had previously (1825) renounced his inheritance.

**Constantinople**, city, formerly the capital of Turkey. Stambul, or Istanbul, the real Constantinople, occupies a peninsula studded with seven low-lying hills and presents a most picturesque appearance, with its varied architecture and gorgeous coloring. It stands on the site of ancient Byzantium. It is triangular in form, with the Golden Horn on the north, the Sea of Marmora on the south, and the Bosphorus at the eastern apex. Across the Golden Horn lies Galata-Pera, connected with Stambul by two iron pontoon bridges. Galata is the chief business quarter of the European merchants. It has a well constructed quay and one long street running parallel to the Golden Horn. Pera, north of Galata, contains the principal hotels, shops, and theaters and the European embassies. Scutari, which is generally considered a suburb of Constantinople, is on the Asiatic side of the Bosphorus and is thoroughly oriental in character.

There are many gardens and beautiful cemeteries scattered throughout the city. The Moslem cemeteries are of great antiquity and are thickly set with cypresses, an ancient custom demanding that a cypress be planted at each Mussulman's grave.

Stambul is surrounded by walls, now largely in ruins. These walls are flanked by many towers and have many historic gates. At the southwest corner of Stambul, where the city walls reach the Sea of Marmora, are the ruins of the Seven Towers, an imperial castle built by Mohammed II. in 1457, once used as a prison.

The Hippodrome, commenced by Severus

and completed by Constantine, a famous place of public amusement, stands in the southeastern part of the city. It contains an obelisk placed there by Theodosius the Great, the Serpent Column, supposed to have been brought from the temple of Apollo at Delphi, and the Colossus, a pillar of masonry 94 ft. high. The Seraglio, at the eastern end of Stambul, was formerly the residence of the Turkish sultans.

Constantinople is celebrated for its many beautiful churches, the most interesting of which belong to the Byzantine period. St. Sophia, the Cathedral Church of ancient Constantinople, is the most famous mosque in Stambul. Three buildings have borne the name and occupied the site of St. Sophia, the first was dedicated in 360; the corner stone of the present and last was laid by Justinian in 532. Among the best known educational institutions are the Greek National Training School at Phanar; the Greek Theological College; Robert College, an American institution; the American College for Girls in Scutari; the Lycæum of Galata; the School of Art; and the Military College at Pankaldi.

There are few manufacturing establishments of any size in Constantinople. Bazaars for a great variety of wares are scattered over the city. The most important is the Great Bazaar, consisting of a labyrinth of streets and alleys, near the center of Stambul.

The Golden Horn affords a safe and commodious harbor, capable of floating 1,200 vessels, and the water is so deep that the largest war-ships can anchor close to shore. Pontoon bridges divide the harbor into an outer port of commerce, between the bridges, and the port of war in which the Turkish battleships are stationed.

The population of Constantinople numbers over 1,000,000, about half of whom are Mohammedans, the rest being Greeks, Armenians, Jews, Bulgarians, and foreigners.

A band of Greeks from Megara in the year 658 B.C. settled on the promontory now occupied by the building and gardens of the Seraglio, and called the settlement Byzantium. This settlement grew and prospered and came under the rule of the Persians. It was a member of the Athenian League. Constantine the Great, in A.D. 330, determined to make it the capital of his empire and it became known as Constantinople or New Rome. On the division of the empire, in 395, it became the residence of the Emperors of the East. Under the influence of a luxurious and immoral court the inhabitants degenerated, lived upon the char-

ity of the emperors, and sought their chief delight in the circus-racing which gave rise to two frivolous and fanatical factions, the Blues and the Greens, whose furious hatred culminated, in 532, ended in the massacre of 30,000. Its strong fortifications protected the city repeatedly against the attacks of foreign foes, but it was eventually taken by the Turks in 1453.

In the years following its capture by the Turks, Constantinople is historically of importance not so much as an individual city as it is as the symbol of Turkish power. After the World War it was decided to allow the Turks to keep their seat of government at Constantinople, on condition that the Dardanelles be placed under international control and the Turkish army reduced to a mere police force. On March 16, 1920, Constantinople was occupied by an Anglo-Franco-Italian army. In October, 1923, Angora, instead of Constantinople, was declared capital of Turkey, by the Grand National Assembly.

Situated between two continents, sitting, as it were, at the crossroads of empire and holding in her hands the keys thereto, there is no one city in the world of such vital interest to so many nations as Constantinople. Since it fell into the hands of the Turks, it has been the most universally desired city in Europe. Within the last century every question of broad political significance has led in some of its ramifications to Constantinople. Its site on the one available land route from Western and Central Europe to the vast treasures of Central and Western Asia make its potentialities for realizing or defeating the ambitions of nations enormous. Russia has seen in it her outlet to the sea and Germany a gateway to the markets of the Orient. Great Britain sees in its control by any other power, a peril to her own trade routes and to the slender threads which link her to her Eastern possessions. Greece claims it is as a historical right since Byzantium was originally a Greek settlement, and both Serbia and Bulgaria desire to possess it.

Constantinople has been the scene of many disastrous fires; and floods of refugees have taxed its resources in recent years. Consult Oman's *The Byzantine Empire*; Hutton's *Constantinople*; Amicis' *Constantinople*; Dwight's *Constantinople, Old and New* (1915); Pears' *Forty Years in Constantinople* (1916); Young's *Constantinople* (1926); Mambourg's *Tourists' Guide* (1927).

**Constantius I., Flavius Valerius** (c. 250-306), Roman emperor known as *Chlorus*. Un-

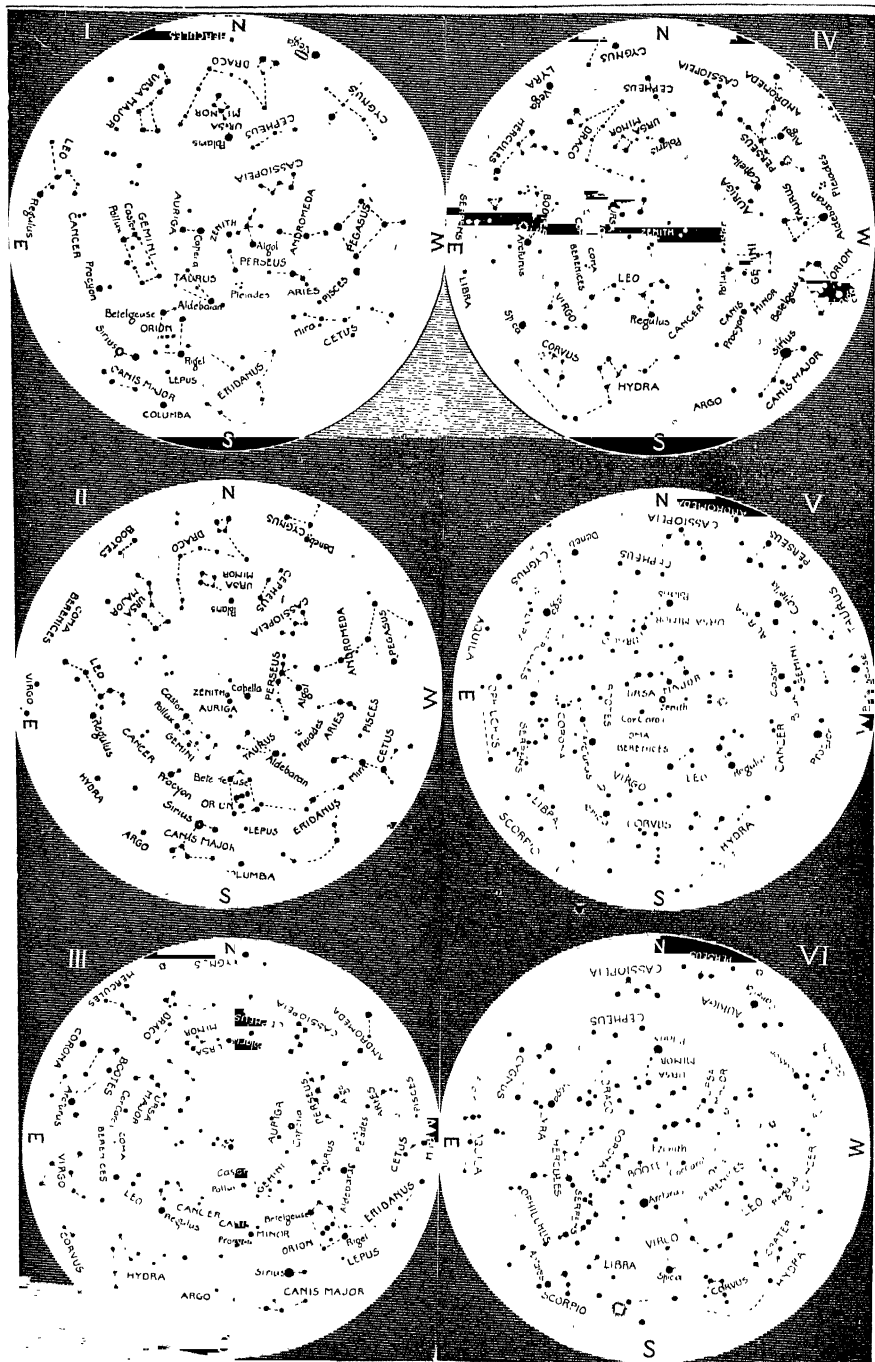
der the reorganization of the Roman Empire by Diocletian, Constantius received the government of Gaul, Britain and Spain, and when Diocletian abdicated (305) the power in the west was left to Constantius, in the east to Galerius.

**Constantius II., Flavius Julius** (317-61), Roman emperor, second son of Constantine the Great. With his two brothers, he succeeded his father in 337, his empire consisting of Thrace, Macedonia, Greece, and Egypt. He subsequently sent his cousin Julian to Gaul against the Alemanni and Franks. Julian repulsed them so successfully that in 360 he was proclaimed emperor. Constantius thereupon marched against him but died on the way.

**Constellation**, a group of stars circumscribed by an imaginary figure. Eudoxus of Cnidus, about 366 B.C., was the first Greek who described with approximate completeness the constellated heavens, and his work, versified in the *Phainomena* of Aratus (270 B.C.), was the chief source of modern star-lore. Most, however, of the forty-five constellations thus transmitted to our acquaintance had originated long previously in the valley of the Euphrates, and symbolized the earliest mythological conceptions of Sumerian peoples. The Greeks took them very much as they found them, and, modifying only the associated legends, brought them into permanent relationship with systematic astronomy. More than 85 constellations are now recognized, some of the names being: Andromeda, Boötes, Cassiopeia, Corona Borealis, Cygnus, Sagitta, Serpens, Ursa Major, Ursa Minor, Gemini, Cancer, Leo, Virgo, Libra, Scorpio, Sagittarius, Capricornus, Canis Major, Canis Minor, Centaurus, Orion.

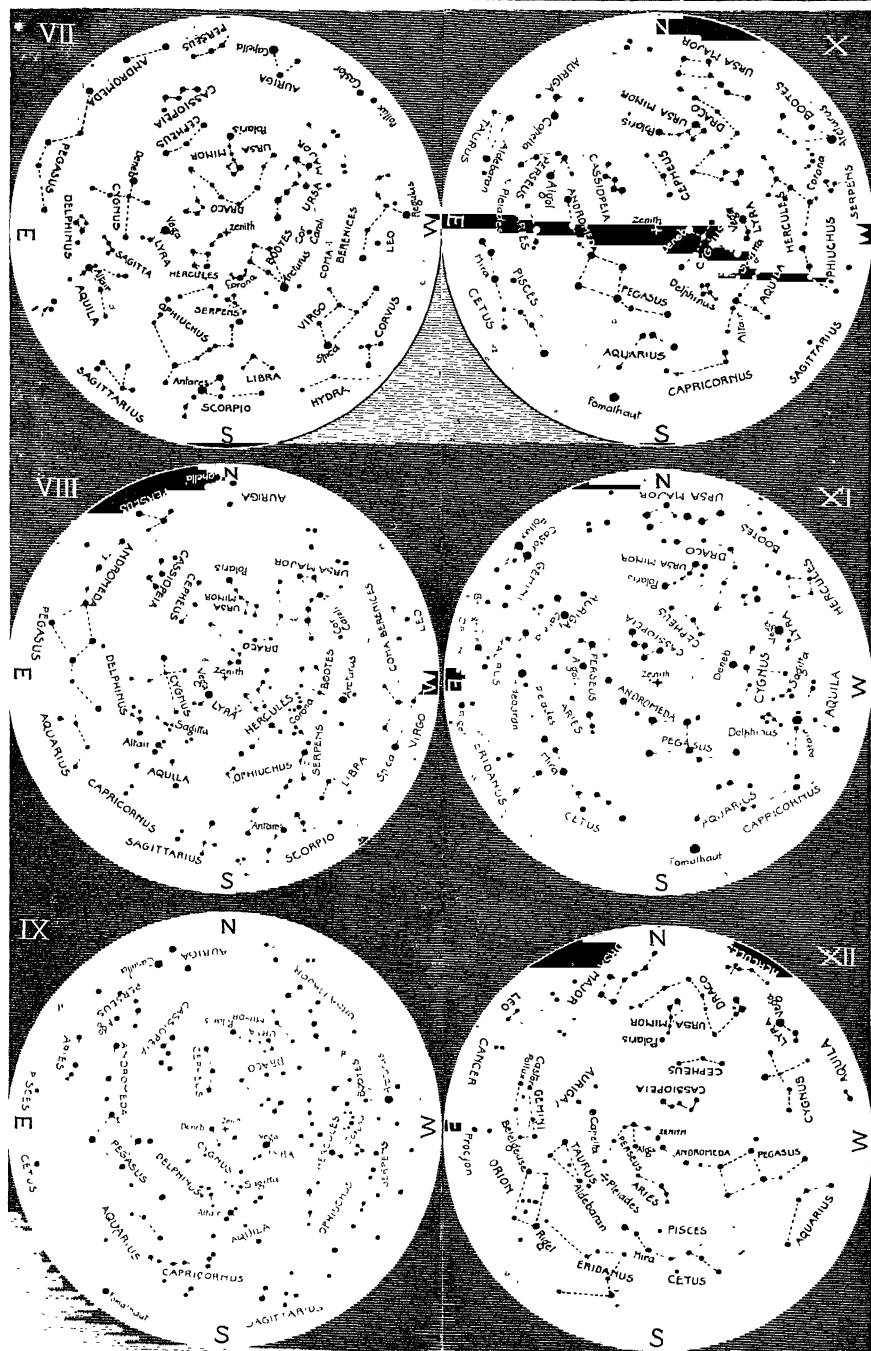
Bayer initiated the system of designating the stars in each constellation in the general order of their brightness, by the letters of the Greek alphabet, and embellished his volume with plates of the 48 antique star-figures from Dürer's fine drawings. Giordano Bruno's satirical proposal (1854) to substitute ethical personifications for the pagan menagerie of the heavens had little result. In 1840, the old asterisms were defined and delimited, rectilinear boundaries replaced vague contours, and the *habitat* of frontier-stars was finally settled. The prehistoric system of nomenclature, however, remains essentially unchanged.

**Constipation**, the condition in which there is irregular or incomplete action of the bowels, with delay in the expulsion of the unassimilated residue of food. The general result of constipation is a form of auto-intoxication, and the



*The Northern Constellations Month by Month.—I.*

I, January. II, February. III, March. IV, April. V, May. VI, June.



### *The Northern Constellations Month by Month—II.*

vii, July. viii, August. ix, September. x, October. xi, November. xii, December.



patient becomes sluggish and depressed, disinclined for mental or physical effort, apt to feel discomfort after meals, liable to headaches and dizziness, and showing an unhealthy skin and a coated tongue. The treatment must depend on the cause, chief of which is the unnatural condition of modern life.

In all cases of simple constipation, diet must be considered first. Often it is found that no water is drunk, and a tumblerful of water on waking and one at night may effect a cure. Fresh fruit and fresh green vegetables are of great use, particularly if taken before or with breakfast. Massage of the abdomen (which can be performed by the patient) for a quarter of an hour daily will stimulate the bowels. Regular daily exercise, of a kind that will bring into play the muscles of the abdomen, must never be neglected. The habit of alternating constipation with drugging is to be avoided.

**Constitution**, as a medical term, is often used synonymously with 'temperament.' Certain marked types are described as the 'gouty,' the 'bilious,' the 'sanguine,' the 'lymphatic,' and so on. This classification refers to the type of disease to which the constitution is most liable. See GOUT; RHEUMATISM; SCROFULA.

**Constitution, The**, popularly called 'Old Ironsides', a famous vessel in the history of the U. S. Navy, was constructed by the government at Boston, and launched there in 1797, and was considered to be an unsurpassed product of the shipbuilding art. She was a frigate of 1,576 tons, and was rated as a 44-gun vessel, though actually carrying 52 guns. It was on board the *Constitution* that the final treaty of peace was negotiated and signed (June 4, 1805), after the war with Tripoli.

During the War of 1812, the *Constitution* defeated and left a total wreck the British frigate *Guerrière*, after a severe fight lasting only thirty minutes; met the frigate *Java* (38 guns) and defeated her after a two-hours' engagement, the British losing 300 in killed and wounded, and the Americans 34; captured the *Pictou* (16 guns) and her convoy; and captured the *Cyane* (34 guns) and the *Levant* (18 guns), but was in turn pursued by three British frigates and forced to relinquish the *Levant*.

In 1828-30 a proposal to dismantle the *Constitution* was abandoned on account of popular opposition, mainly aroused by the publication of O. W. Holmes' poem 'Old Ironsides.' Subsequently she was used as a training ship, and since 1897 has lain at the Boston Navy

Yard. Consult Hollis' *The Frigate Constitution*.

**Constitution of the United States.**—The English settlers in Virginia, Plymouth, Massachusetts, Connecticut, and the other original colonies, many of them exiles for conscience' sake, carried the English principles of self-government to their new homes, and elaborated and practised them to an extent unknown in the mother country. In 1619 the first representative assembly was established at Jamestown in Virginia; and in 1639 the first modern written constitution was adopted by the townships of Connecticut, serving as a model to the other twelve colonies. Its distinctive principle was that all public officials and members of both legislative chambers were elective. Upon the formation of the State governments, which supplanted the colonial governments after 1775, many new constitutions were adopted. The essential features of these consisted of a bill of rights stating the powers of the government created and the limitations upon such powers, and a description of the framework of the new government.

The first official draft of a plan for the formation of the Federal Government was submitted to the States for ratification in 1777, under the title 'Articles of Confederation.' The ratification of every State was required to put the government into effect, and in 1781 this had been secured. The government thus established consisted of a legislative department only. Practically the sole powers of the government were the carrying on of foreign relations and the determining of peace and war. The government proved to have insufficient power even to enforce upon the States treaty obligations with foreign governments. See ARTICLES OF CONFEDERATION.

In order to remedy these defects, Congress recommended that the several States send delegates to a Convention for the purpose of revising the Articles of Confederation. This Convention met at Philadelphia from May 29 to Sept. 17, 1787, and was attended by 55 delegates, all the States except Rhode Island being represented. The result of their four-months' deliberations was the present Constitution of the United States. Their labors were approved by Congress, and the new Constitution was ratified by eleven of the thirteen States in 1788, by North Carolina in 1789, and by Rhode Island in 1790.

The Constitution, as finally drafted, represented three great compromises: 1. between a national party and a State sovereignty party, by

providing for a much stronger Congress than the one under the Articles of Confederation which the Constitution replaced, and for a Federal executive and judiciary which had not existed before—but reserving to the States or to the people ‘powers not delegated to the United States . . . nor prohibited . . . to the States’ (Tenth Amendment); 2. between a large State party, which wished legislative representation based on population, and a small State party, which organized slowly in the Convention and repeatedly threatened to break it up, and which wished all States to have equal representation—by a bi-cameral legislature, with a lower house in which representation was based on population, and an upper house representing the States as States; and 3. between the slave States and the free, that, for direct taxation and for representation, only three-fifths of the negroes should be counted, but that fugitive slaves should be returned by one State to another, and that the importation of slaves should not be prohibited before 1808.

The sources of the Constitution lie in British and American governmental experience, and the attempts to trace features to Dutch, Swiss, or other foreign sources are fanciful. Among the prominent leaders in the Constitutional Convention were: Washington, its presiding officer; the nationalizers, Hamilton, Gouverneur Morris, who finally drafted the measure in its clear English, Wilson, King, and Madison; the State sovereignty men, Lansing, Yates, Paterson, Luther Martin, and Bedford; those who sympathized at first with the nationalizers and then with the group last mentioned, including Randolph, Mason, and Gerry; and a few whose main object was conciliation, notably Franklin, Sherman, the two Pinckneys, and Ellsworth. The working plan was that introduced by the Virginia delegates, drafted largely by Madison and presented by Randolph; the New Jersey, or small-State, plan was presented by Paterson, and was a revision of the Articles of Confederation; and the Connecticut compromise, providing for the two systems of representation in the two branches of Congress, was largely due to Ellsworth. In the struggle for the ratification of the Constitution by the States, the great influence was the brilliant series of essays entitled *The Federalist*, published anonymously in 1787-8 by Hamilton, Madison, and Jay.

The work of the Supreme Court in interpreting the Constitution is dealt with in the article SUPREME COURT; but mention should be made here of the influence of John Marshall,

Chief Justice in 1801-35, toward greater centralization of power. The logic of events, notably in the Civil War, disproved fine-spun theories of nullification, State sovereignty, and State rights, and that in more recent years the tendency seems to be toward greater centralization, the encroachment of Federal upon State power, and the growth of the Executive Branch at the expense of the Legislative Branch.

**Text of the Constitution.**—The Constitution of the United States is divided into seven Articles, supplemented to 1934 by twenty-one Amendments. The text follows, with Preamble:

We the People of the United States, in Order to form a more perfect Union, establish Justice, insure domestic Tranquility, provide for the common defence, promote the general Welfare, and secure the Blessings of Liberty to ourselves and our Posterity, do ordain and establish this Constitution for the United States of America.

#### ARTICLE I.

*Section 1.* All legislative Powers herein granted shall be vested in a Congress of the United States, which shall consist of a Senate and House of Representatives.

*Section 2.* The House of Representatives shall be composed of Members chosen every second Year by the People of the several States, and the Electors in each State shall have the Qualifications requisite for Electors of the most numerous Branch of the State Legislature.

No Person shall be a Representative who shall not have attained to the Age of twenty five Years, and been seven Years a Citizen of the United States, and who shall not, when elected, be an Inhabitant of that State in which he shall be chosen.

Representatives and direct Taxes shall be apportioned among the several States which may be included within this Union, according to their respective Numbers, which shall be determined by adding to the whole Number of free Persons, including those bound to Service for a Term of Years, and excluding Indians not taxed, three fifths of all other Persons. The actual Enumeration shall be made within three Years after the first Meeting of the Congress of the United States, and within every subsequent Term of ten Years, in such Manner as they shall by Law direct. The Number of Representatives shall not exceed one for every thirty Thousand, but each State shall have at Least one Representative,

and until such enumeration shall be made, the State of New Hampshire shall be entitled to chuse three, Massachusetts eight, Rhode-Island and Providence Plantations one, Connecticut five, New-York six, New Jersey four, Pennsylvania eight, Delaware one, Maryland six, Virginia ten, North Carolina five, South Carolina five, and Georgia three.

When vacancies happen in the Representation from any State, the Executive Authority thereof shall issue Writs of Election to fill such Vacancies.

The House of Representatives shall chuse their Speaker and other Officers; and shall have the sole Power of Impeachment.

*Section 3.* The Senate of the United States shall be composed of two Senators from each State, chosen by the Legislature thereof, for six Years; and each Senator shall have one Vote.

Immediately after they shall be assembled in Consequence of the first Election, they shall be divided as equally as may be into three Classes. The Seats of the Senators of the first Class shall be vacated at the Expiration of the second Year, of the second Class at the Expiration of the fourth Year, and of the third Class at the Expiration of the sixth Year, so that one third may be chosen every second Year; and if Vacancies happen by Resignation, or otherwise, during the Recess of the Legislature of any State, the Executive thereof may make temporary Appointments until the next Meeting of the Legislature, which shall then fill such Vacancies.

No Person shall be a Senator who shall not have attained to the Age of thirty Years, and been nine Years a Citizen of the United States, and who shall not, when elected, be an Inhabitant of that State for which he shall be chosen.

The Vice President of the United States shall be President of the Senate, but shall have no Vote, unless they be equally divided.

The Senate shall chuse their other Officers, and also a President pro tempore, in the Absence of the Vice President, or when he shall exercise the Office of President of the United States.

The Senate shall have the sole Power to try all Impeachments. When sitting for that Purpose, they shall be on Oath or Affirmation. When the President of the United States is tried, the Chief Justice shall preside: And no Person shall be convicted without the Concurrence of two thirds of the Members present.

Judgment in Cases of Impeachment shall not extend further than to removal from Office,

and disqualification to hold and enjoy any Office of honor, Trust or Profit under the United States: but the Party convicted shall nevertheless be liable and subject to Indictment, Trial, Judgment and Punishment, according to Law.

*Section 4.* The Times, Places and Manner of holding Elections for Senators and Representatives, shall be prescribed in each State by the Legislature thereof; but the Congress may at any time by Law make or alter such Regulations, except as to the Places of chusing Senators.

The Congress shall assemble at least once in every Year, and such Meeting shall be on the first Monday in December, unless they shall by Law appoint a different Day.

*Section 5.* Each House shall be the Judge of the Elections, Returns and Qualifications of its own Members, and a Majority of each shall constitute a Quorum to do Business; but a smaller Number may adjourn from day to day, and may be authorized to compel the Attendance of absent Members, in such Manner, and under such Penalties as each House may provide.

Each House may determine the Rules of its Proceedings, punish its Members for disorderly Behaviour, and, with the Concurrence of two thirds, expel a Member.

Each House shall keep a Journal of its Proceedings, and from time to time publish the same, excepting such Parts as may in their Judgment require Secrecy; and the Yeas and Nays of the Members of either House on any question shall, at the Desire of one fifth of those Present, be entered on the Journal.

Neither House, during the Session of Congress, shall, without the Consent of the other, adjourn for more than three days, nor to any other Place than that in which the two Houses shall be sitting.

*Section 6.* The Senators and Representatives shall receive a Compensation for their Services, to be ascertained by Law, and paid out of the Treasury of the United States. They shall in all Cases, except Treason, Felony and Breach of the Peace, be privileged from Arrest during their Attendance at the Session of their respective Houses, and in going to and returning from the same; and for any Speech or Debate in either House, they shall not be questioned in any other Place.

No Senator or Representative shall, during the Time for which he was elected, be appointed to any civil Office under the Authority of the United States, which shall have been created, or the Emoluments whereof shall

have been increased during such time; and no Person holding any Office under the United States, shall be a Member of either House during his Continuance in Office.

*Section 7.* All Bills for raising Revenue shall originate in the House of Representatives; but the Senate may propose or concur with Amendments as on other Bills.

Every Bill which shall have passed the House of Representatives and the Senate, shall before it become a Law, be presented to the President of the United States; If he approve he shall sign it, but if not he shall return it, with his Objections to that House in which it shall have originated, who shall enter the Objections at large on their Journal, and proceed to reconsider it. If after such Reconsideration two thirds of that House shall agree to pass the Bill, it shall be sent, together with the Objections, to the other House, by which it shall likewise be reconsidered, and if approved by two thirds of that House, it shall become a Law. But in all such Cases the Votes of both Houses shall be determined by yeas and Nays, and the Names of the Persons voting for and against the Bill shall be entered on the Journal of each House respectively. If any Bill shall not be returned by the President within ten Days (Sundays excepted) after it shall have been presented to him, the Same shall be a Law, in like Manner as if he had signed it, unless the Congress by their Adjournment prevent its Return, in which Case it shall not be a Law.

Every Order, Resolution, or Vote to which the Concurrence of the Senate and House of Representatives may be necessary (except on a question of Adjournment) shall be presented to the President of the United States; and before the Same shall take Effect, shall be approved by him, or being disapproved by him, shall be repassed by two thirds of the Senate and House of Representatives, according to the Rules and Limitations prescribed in the Case of a Bill.

*Section 8.* The Congress shall have Power To lay and collect Taxes, Duties, Imposts and Excises, to pay the Debts and provide for the common Defence and general Welfare of the United States; but all Duties, Imposts and Excises shall be uniform throughout the United States;

To borrow Money on the credit of the United States;

To regulate Commerce with foreign Nations, and among the several States, and with the Indian Tribes;

To establish a uniform Rule of Naturaliza-

tion, and uniform Laws on the subject of Bankruptcies throughout the United States;

To coin Money, regulate the Value thereof, and of foreign Coin, and fix the Standard of Weights and Measures;

To provide for the Punishment of counterfeiting the Securities and current Coin of the United States;

To establish Post Offices and post Roads;

To promote the Progress of Science and useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries;

To constitute Tribunals inferior to the supreme Court;

To define and punish Piracies and Felonies committed on the high Seas, and Offences against the Law of Nations;

To declare War, grant Letters of Marque and Reprisal, and make Rules concerning captures on Land and Water;

To raise and support Armies, but no Appropriation of Money to that Use shall be for a longer Term than two Years;

To provide and maintain a Navy;

To make Rules for the Government and Regulation of the land and naval Forces;

To provide for calling forth the Militia to execute the Laws of the Union, suppress Insurrections and repel Invasions;

To provide for organizing, arming, and disciplining, the Militia, and for governing such Part of them as may be employed in the Service of the United States, reserving to the States respectively, the Appointment of the Officers, and the Authority of training the Militia according to the discipline prescribed by Congress;

To exercise exclusive Legislation in all Cases whatsoever, over such District (not exceeding ten Miles square) as may, by Cession of particular States, and the Acceptance of Congress, become the Seat of the Government of the United States, and to exercise like Authority over all Places purchased by the Consent of the Legislature of the State in which the Same shall be, for the Erection of Forts, Magazines, Arsenals, dock-Yards, and other needful Buildings;—And

To make all Laws which shall be necessary and proper for carrying into Execution the foregoing Powers, and all other Powers vested by this Constitution in the Government of the United States, or in any Department or Officer thereof.

*Section 9.* The Migration or Importation of such Persons as any of the States now existing shall think proper to admit, shall not be pro-

hibited by the Congress prior to the Year one thousand eight hundred and eight, but a Tax or duty may be imposed on such Importation, not exceeding ten dollars for each Person.

The Privilege of the Writ of Habeas Corpus shall not be suspended, unless when in Cases of Rebellion or Invasion the public Safety may require it.

No Bill of Attainder or ex post facto Law shall be passed.

No Capitation, or other direct, Tax shall be laid, unless in Proportion to the Census or Enumeration herein before directed to be taken.

No Tax or Duty shall be laid on Articles exported from any State.

No Preference shall be given by any Regulation of Commerce or Revenue to the Ports of one State over those of another: nor shall Vessels bound to, or from, one State, be obliged to enter, clear, or pay Duties in another.

No Money shall be drawn from the Treasury, but in Consequence of Appropriations made by Law; and a regular Statement and Account of the Receipts and Expenditures of all public Money shall be published from time to time.

No Title of Nobility shall be granted by the United States: And no Person holding any Office of Profit or Trust under them, shall, without the Consent of the Congress, accept of any present, Emolument, Office, or Title, of any kind whatever, from any King, Prince, or foreign State.

*Section 10.* No State shall enter into any Treaty, Alliance, or Confederation; grant Letters of Marque and Reprisal; coin Money; emit Bills of Credit; make any Thing but gold and silver Coin a Tender in Payment of Debts; pass any Bill of Attainder, ex post facto Law, or Law impairing the Obligation of Contracts, or grant any Title of Nobility.

No State shall, without the Consent of the Congress, lay any Imposts or Duties on Imports or Exports, except what may be absolutely necessary for executing it's inspection Laws: and the net Produce of all Duties and Imposts, laid by any State on Imports or Exports, shall be for the Use of the Treasury of the United States; and all such Laws shall be subject to the Revision and Controul of the Congress.

No State shall, without the Consent of Congress, lay any Duty of Tonnage, keep Troops, or Ships of War in time of Peace, enter into any Agreement or Compact with another State, or with a foreign Power, or engage in

War, unless actually invaded, or in such imminent Danger as will not admit of delay.

## ARTICLE II.

*Section 1.* The executive Power shall be vested in a President of the United States of America. He shall hold his Office during the Term of four Years, and, together with the Vice President, chosen for the same Term, be elected, as follows

Each State shall appoint, in such Manner as the Legislature thereof may direct, a Number of Electors, equal to the whole Number of Senators and Representatives to which the State may be entitled in the Congress: but no Senator or Representative, or Person holding an Office of Trust or Profit under the United States, shall be appointed an Elector.

The Electors shall meet in their respective States, and vote by Ballot for two Persons, of whom one at least shall not be an Inhabitant of the same State with themselves. And they shall make a List of all the Persons voted for, and of the Number of Votes for each; which List they shall sign and certify, and transmit sealed to the Seat of the Government of the United States, directed to the President of the Senate. The President of the Senate shall, in the Presence of the Senate and House of Representatives, open all the Certificates, and the Votes shall then be counted. The Person having the greatest Number of Votes shall be the President if such Number be a Majority of the whole Number of Electors appointed; and if there be more than one who have such Majority, and have an equal Number of Votes, then the House of Representatives shall immediately chuse by Ballot one of them for President; and if no Person have a majority, then from the five highest on the List the said House shall in like Manner chuse the President. But in chusing the President, the Votes shall be taken by States, the Representation from each State having one Vote; A quorum for this Purpose shall consist of a Member or Members from two thirds of the States, and a Majority of all the States shall be necessary to a Choice. In every Case, after the Choice of the President, the Person having the greatest Number of Votes of the Electors shall be the Vice President. But if there should remain two or more who have equal Votes, the Senate shall chuse from them by Ballot the Vice President.

The Congress may determine the Time of chusing the Electors, and the Day on which they shall give their Votes; which Day shall be the same throughout the United States.

No Person except a natural born Citizen, or a Citizen of the United States, at the time of the Adoption of this Constitution, shall be eligible to the Office of President; neither shall any Person be eligible to that Office who shall not have attained to the Age of thirty five Years, and been fourteen Years a Resident within the United States.

In Case of the Removal of the President from Office, or of his Death, Resignation, or Inability to discharge the Powers and Duties of the said Office, the Same shall devolve on the Vice President, and the Congress may by Law provide for the Case of Removal, Death, Resignation or Inability, both of the President and Vice President, declaring what Officer shall then act as President, and such Officer shall act accordingly, until the Disability be removed, or a President shall be elected.

The President shall, at stated Times, receive for his Services, a Compensation, which shall neither be increased nor diminished during the Period for which he shall have been elected, and he shall not receive within that Period any other Emolument from the United States, or any of them.

Before he enter on the Execution of his Office, he shall take the following Oath or Affirmation:—"I do solemnly swear (or affirm) that I will faithfully execute the Office of President of the United States and will to the best of my Ability, preserve, protect and defend the Constitution of the United States."

*Section 2.* The President shall be Commander in Chief of the Army and Navy of the United States, and of the Militia of the several States, when called into the actual Service of the United States; he may require the Opinion, in writing, of the principal Officer in each of the executive Departments, upon any Subject relating to the Duties of their respective Offices, and he shall have Power to grant Reprieves and Pardons for Offences against the United States, except in Cases of Impeachment.

He shall have Power, by and with the Advice and Consent of the Senate, to make Treaties, provided two thirds of the Senators present concur; and he shall nominate, and by and with the Advice and Consent of the Senate, shall appoint Ambassadors, other public Ministers and Consuls, Judges of the supreme Court, and all other Officers of the United States, whose Appointments are not herein otherwise provided for, and which shall be established by Law: but the Congress may by Law vest the Appointment of such inferior Officers, as they think proper, in the President

alone, in the Courts of Law, or in the Heads of Departments.

The President shall have Power to fill up all Vacancies that may happen during the Recess of the Senate, by granting Commissions which shall expire at the End of their next Session.

*Section 3.* He shall from time to time give to the Congress Information of the State of the Union, and recommend to their Consideration such Measures as he shall judge necessary and expedient; he may, on extraordinary Occasions, convene both Houses, or either of them, and in Case of Disagreement between them, with Respect to the Time of Adjournment, he may adjourn them to such Time as he shall think proper; he shall receive Ambassadors and other public Ministers; he shall take Care that the Laws be faithfully executed, and shall Commission all the Officers of the United States.

*Section 4.* The President, Vice President and all civil Officers of the United States, shall be removed from Office on Impeachment for, and Conviction of, Treason, Bribery, or other high Crimes and Misdemeanors.

### ARTICLE III.

*Section 1.* The judicial Power of the United States, shall be vested in one supreme Court, and in such inferior Courts as the Congress may from time to time ordain and establish. The Judges, both of the supreme and inferior Courts, shall hold their Offices during good Behaviour, and shall, at stated Times, receive for their Services, a Compensation, which shall not be diminished during their Continuance in Office.

*Section 2.* The judicial Power shall extend to all Cases, in Law and Equity, arising under this Constitution, the Laws of the United States, and Treaties made, or which shall be made, under their Authority,—to all Cases affecting Ambassadors, other public Ministers and Consuls;—to all Cases of admiralty and maritime Jurisdiction;—to Controversies to which the United States shall be a Party;—to Controversies between two or more States;—between a State and Citizens of another State;—between Citizens of different States;—between Citizens of the same State claiming Lands under Grants of different States, and between a State, or the Citizens thereof, and foreign States, Citizens or Subjects.

In all Cases affecting Ambassadors, other public Ministers and Consuls, and those in which a State shall be Party, the supreme Court shall have original Jurisdiction. In all

the other Cases before mentioned, the supreme Court shall have appellate Jurisdiction, both as to Law and Fact, with such Exceptions, and under such Regulations as the Congress shall make.

The Trial of all Crimes, except in Cases of Impeachment, shall be by Jury; and such Trial shall be held in the State where the said Crimes shall have been committed; but when not committed within any State, the Trial shall be at such Place or Places as the Congress may by Law have directed.

*Section 3.* Treason against the United States, shall consist only in levying War against them, or in adhering to their Enemies, giving them Aid and Comfort. No Person shall be convicted of Treason unless on the Testimony of two Witnesses to the same overt Act, or on Confession in open Court.

The Congress shall have Power to declare the Punishment of Treason, but no Attainder of Treason shall work Corruption of Blood, or Forfeiture except during the Life of the Person attainted.

#### ARTICLE IV.

*Section 1.* Full Faith and Credit shall be given in each State to the public Acts, Records, and judicial Proceedings of every other State. And the Congress may by general Laws prescribe the Manner in which such Acts, Records and Proceedings shall be proved, and the Effect thereof.

*Section 2.* The Citizens of each State shall be entitled to all Privileges and Immunities of Citizens in the several States.

A Person charged in any State with Treason, Felony, or other Crime, who shall flee from Justice, and be found in another State, shall on Demand of the executive Authority of the State from which he fled, be delivered up, to be removed to the State having Jurisdiction of the Crime.

No Person held to Service or Labour in one State, under the Laws thereof, escaping into another, shall, in Consequence of any Law or Regulation therein, be discharged from such Service or Labour, but shall be delivered upon Claim of the Party to whom such Service or Labour may be due.

*Section 3.* New States may be admitted by the Congress into this Union; but no new State shall be formed or erected within the Jurisdiction of any other State; nor any State be formed by the Junction of two or more States, or Parts of States, without the Consent of the Legislatures of the States concerned as well as of the Congress.

The Congress shall have Power to dispose of and make all needful Rules and Regulations respecting the Territory or other Property belonging to the United States; and nothing in this Constitution shall be so construed as to Prejudice any Claims of the United States, or of any particular State.

*Section 4.* The United States shall guarantee to every State in this Union a Republican Form of Government, and shall protect each of them against Invasion; and on Application of the Legislature, or of the Executive (when the Legislature cannot be convened) against domestic Violence.

#### ARTICLE V.

The Congress, whenever two thirds of both Houses shall deem it necessary, shall propose Amendments to this Constitution, or, on the Application of the Legislatures of two thirds of the several States, shall call a Convention for proposing Amendments, which, in either Case, shall be valid to all Intents and Purposes, as Part of this Constitution, when ratified by the Legislatures of three fourths of the several States, or by Conventions in three fourths thereof, as the one or the other Mode of Ratification may be proposed by the Congress; Provided that no Amendment which may be made prior to the Year One thousand eight hundred and eight shall in any Manner affect the first and fourth Clauses in the Ninth Section of the first Article; and that no State, without its Consent, shall be deprived of its equal Suffrage in the Senate.

#### ARTICLE VI.

All Debts contracted and Engagements entered into, before the Adoption of this Constitution, shall be as valid against the United States under this Constitution, as under the Confederation.

This Constitution, and the Laws of the United States which shall be made in Pursuance thereof; and all Treaties made, or which shall be made, under the Authority of the United States, shall be the supreme Law of the Land; and the Judges in every State shall be bound thereby, any Thing in the Constitution or Laws of any State to the Contrary notwithstanding.

The Senators and Representatives before mentioned, and the Members of the several State Legislatures, and all executive and judicial Officers, both of the United States and of the several States, shall be bound by Oath or Affirmation, to support this Constitution;

but no religious Test shall ever be required as a Qualification to any Office or public Trust under the United States.

#### ARTICLE VII.

The Ratification of the Conventions of nine States, shall be sufficient for the Establishment of this Constitution between the States so ratifying the Same.

done in Convention by the Unanimous Consent of the States present the Seventeenth Day of September in the Year of our Lord one thousand seven hundred and Eighty seven and of the Independance of the United States of America the Twelfth. In witness whereof We have hereunto subscribed our Names, Attest  
WILLIAM JACKSON

Secretary

G<sup>o</sup> WASHINGTON—Presid<sup>t</sup>

and deputy from Virginia

New Hampshire—JOHN LANGDON, NICHOLAS GILMAN.

Massachusetts—NATHANIEL GORHAM, RUFUS KING.

Connecticut—W<sup>m</sup> SAM<sup>l</sup> JOHNSON, ROGER SHERMAN.

New York—ALEXANDER HAMILTON.

New Jersey—WIL<sup>l</sup> LIVINGSTON, DAVID BREARLEY, W<sup>m</sup> PATERSON, JONA<sup>s</sup> DAYTON.

Pennsylvania—B. FRANKLIN, THOMAS MIFFLIN, ROB<sup>t</sup> MORRIS, GEO. CLYMER, THO<sup>s</sup> FITZSIMONS, JARED INGERSOLL, JAMES WILSON, GOUV MORRIS.

Delaware—GEO. READ, GUNNING BEDFORD jun., JOHN DICKINSON, RICHARD BASSETT, JACO. BROOM.

Maryland—JAMES MCHENRY, DAN OF ST<sup>c</sup> THO<sup>s</sup> JENIFER, DAN<sup>l</sup> CARROLL.

Virginia—JOHN BLAIR, JAMES MADISON JR.

North Carolina—W<sup>m</sup> BLOUNT, RICH<sup>d</sup> DOBBS SPAIGHT, HU WILLIAMSON.

South Carolina—J. RUTLEDGE, CHARLES COTESWORTH PINCKNEY, CHARLES PINCKNEY, PIERCE BUTLER.

Georgia—WILLIAM FEW, ABR BALDWIN.

In Convention Monday September 17th 1787.

Present The States of New Hampshire, Massachusetts, Connecticut, M<sup>t</sup> Hamilton from New York, New Jersey, Pennsylvania, Delaware, Maryland, Virginia, North Carolina, South Carolina and Georgia. Resolved,

That the preceding Constitution be laid before the United States in Congress assembled, and that it is the Opinion of this Convention, that it should afterwards be submitted to a Convention of Delegates, chosen in each State by the People thereof, under the

Recommendation of its Legislature, for their Assent and Ratification; and that each Convention assenting to, and ratifying the Same, should give Notice thereof to the United States in Congress assembled.

Resolved, That it is the Opinion of this Convention, that as soon as the Conventions of nine States shall have ratified this Constitution, the United States in Congress assembled should fix a Day on which Electors should be appointed by the States which shall have ratified the same, and a Day on which the Electors should assemble to vote for the President, and the Time and Place for commencing Proceedings under this Constitution. That after such Publication the Electors should be appointed, and the Senators and Representatives elected: That the Electors should meet on the Day fixed for the Election of the President and should transmit their Votes certified, signed, sealed and directed, as the Constitution requires, to the Secretary of the United States in Congress assembled, that the Senators and Representatives should convene at the Time and Place assigned; that the Senators should appoint a President of the Senate, for the sole Purpose of receiving, opening and counting the Votes for President; and, that after he shall be chosen, the Congress, together with the President, should, without Delay, proceed to execute this Constitution.

By the Unanimous Order of the Convention  
G<sup>o</sup> WASHINGTON Presid<sup>t</sup>  
W. JACKSON Secretary.

#### AMENDMENTS.

ARTICLES in addition to, and Amendment of the Constitution of the United States of America, proposed by Congress, and ratified by the Legislatures of the several States, pursuant to the fifth Article of the original Constitution.

#### ARTICLE I.

Congress shall make no law respecting an establishment of religion, or prohibiting the free exercise thereof; or abridging the freedom of speech, or of the press; or the right of the people peaceably to assemble, and to petition the Government for a redress of grievances.

#### ARTICLE II.

A well regulated Militia, being necessary to the security of a free State, the right of the people to keep and bear Arms, shall not be infringed.



## ARTICLE III.

No Soldier shall, in time of peace be quartered in any house, without the consent of the Owner, nor in time of war, but in a manner to be prescribed by law.

## ARTICLE IV.

The right of the people to be secure in their persons, houses, papers, and effects, against unreasonable searches and seizures, shall not be violated, and no Warrants shall issue, but upon probable cause, supported by Oath or affirmation, and particularly describing the place to be searched, and the persons or things to be seized.

## ARTICLE V.

No person shall be held to answer for a capital, or otherwise infamous crime, unless on a presentment or indictment of a Grand Jury, except in cases arising in the land or naval forces, or in the Militia, when in actual service in time of War or public danger; nor shall any person be subject for the same offence to be twice put in jeopardy of life or limb; nor shall be compelled in any criminal case to be a witness against himself, nor be deprived of life, liberty, or property, without due process of law; nor shall private property be taken for public use, without just compensation.

## ARTICLE VI.

In all criminal prosecutions, the accused shall enjoy the right to a speedy and public trial, by an impartial jury of the State and district wherein the crime shall have been committed, which district shall have been previously ascertained by law, and to be informed of the nature and cause of the accusation; to be confronted with the witnesses against him; to have compulsory process for obtaining witnesses in his favor, and to have the Assistance of Counsel for his defence.

## ARTICLE VII.

In Suits at common law, where the value in controversy shall exceed twenty dollars, the right of trial by jury shall be preserved, and no fact tried by a jury, shall be otherwise re-examined in any Court of the United States, than according to the rules of the common law.

## ARTICLE VIII.

Excessive bail shall not be required, nor excessive fines imposed, nor cruel and unusual punishments inflicted.

## ARTICLE IX.

The enumeration in the Constitution, of certain rights, shall not be construed to deny or disparage others retained by the people.

## ARTICLE X.

The powers not delegated to the United States by the Constitution, nor prohibited by it to the States, are reserved to the States respectively, or to the people.

## ARTICLE XI.

The Judicial power of the United States shall not be construed to extend to any suit in law or equity, commenced or prosecuted against one of the United States by Citizens of another State, or by Citizens or Subjects of any Foreign State.

## ARTICLE XII.

The Electors shall meet in their respective states, and vote by ballot for President and Vice-President, one of whom, at least, shall not be an inhabitant of the same state with themselves; they shall name in their ballots the person voted for as President, and in distinct ballots the person voted for as Vice-President, and they shall make distinct lists of all persons voted for as President, and of all persons voted for as Vice-President, and of the number of votes for each, which lists they shall sign and certify, and transmit sealed to the seat of the government of the United States, directed to the President of the Senate:—The President of the Senate shall, in the presence of the Senate and House of Representatives, open all the certificates and the votes shall then be counted;—The person having the greatest number of votes for President, shall be the President, if such number be a majority of the whole number of Electors appointed; and if no person have such a majority, then from the persons having the highest numbers not exceeding three on the list of those voted for as President, the House of Representatives shall choose immediately, by ballot, the President. But in choosing the President, the votes shall be taken by states, the representation from each state having one vote; a quorum for this purpose shall consist of a member or members from two-thirds of the states, and a majority of all the states shall be necessary to a choice. And if the House of Representatives shall not choose a President whenever the right of choice shall devolve upon them, before the fourth day of March next following, then the Vice-President shall act as President, as in the

case of the death or other constitutional disability of the President.—The person having the greatest number of votes as Vice-President, shall be the Vice-President, if such number be a majority of the whole number of Electors appointed, and if no person have a majority, then from the two highest numbers on the list, the Senate shall choose the Vice-President; a quorum for the purpose shall consist of two-thirds of the whole number of Senators, and a majority of the whole number shall be necessary to a choice. But no person constitutionally ineligible to the office of President shall be eligible to that of Vice-President of the United States.

### ARTICLE XIII.

*Section 1.* Neither slavery nor involuntary servitude, except as a punishment for crime whereof the party shall have been duly convicted, shall exist within the United States, or any place subject to their jurisdiction.

*Section 2.* Congress shall have power to enforce this article by appropriate legislation.

### ARTICLE XIV.

*Section 1.* All persons born or naturalized in the United States, and subject to the jurisdiction thereof, are citizens of the United States and of the State wherein they reside. No State shall make or enforce any law which shall abridge the privileges or immunities of citizens of the United States; nor shall any State deprive any person of life, liberty, or property, without due process of law; nor deny to any person within its jurisdiction the equal protection of the laws.

*Section 2.* Representatives shall be apportioned among the several States according to their respective numbers, counting the whole number of persons in each State, excluding Indians not taxed. But when the right to vote at any election for the choice of electors for President and Vice President of the United States, Representatives in Congress, the Executive and Judicial officers of a State, or the members of the Legislature thereof, is denied to any of the male inhabitants of such State, being twenty-one years of age, and citizens of the United States, or in any way abridged, except for participation in rebellion, or other crime, the basis of representation therein shall be reduced in the proportion which the number of such male citizens shall bear to the whole number of male citizens twenty-one years of age in such State.

*Section 3.* No person shall be a Senator or Representative in Congress, or elector of Presi-

dent and Vice President, or hold any office, civil or military, under the United States, or under any State, who, having previously taken an oath, as a member of Congress, or as an officer of the United States, or as a member of any State legislature, or as an executive or judicial officer of any State, to support the Constitution of the United States, shall have engaged in insurrection or rebellion against the same, or given aid or comfort to the enemies thereof. But Congress may by a vote of two-thirds of each House, remove such disability.

*Section 4.* The validity of the public debt of the United States, authorized by law, including debts incurred for payment of pensions and bounties for services in suppressing insurrection or rebellion, shall not be questioned. But neither the United States nor any State shall assume or pay any debt or obligation incurred in aid of insurrection or rebellion against the United States, or any claim for the loss or emancipation of any slave; but all such debts, obligations and claims shall be held illegal and void.

*Section 5.* The Congress shall have power to enforce, by appropriate legislation, the provisions of this article.

### ARTICLE XV.

*Section 1.* The right of citizens of the United States to vote shall not be denied or abridged by the United States or by any State on account of race, color, or previous condition of servitude.—

*Section 2.* The Congress shall have power to enforce this article by appropriate legislation.—

### ARTICLE XVI.

The Congress shall have power to lay and collect taxes on incomes, from whatever source derived, without apportionment among the several States, and without regard to any census or enumeration.

### ARTICLE XVII.

The Senate of the United States shall be composed of two Senators from each State, elected by the people thereof, for six years; and each Senator shall have one vote. The electors in each State shall have the qualifications requisite for electors of the most numerous branch of the State legislatures.

When vacancies happen in the representation of any State in the Senate, the executive authority of such State shall issue writs of election to fill such vacancies: *Provided*, That the legislature of any State may empower the

executive thereof to make temporary appointments until the people fill the vacancies by election as the legislature may direct.

This amendment shall not be so construed as to affect the election or term of any Senator chosen before it becomes valid as part of the Constitution.

#### ARTICLE XVIII.

*Section 1.* After one year from the ratification of this article the manufacture, sale, or transportation of intoxicating liquors within, the importation thereof into, or the exportation thereof from the United States and all territory subject to the jurisdiction thereof for beverage purposes is hereby prohibited.

*Section 2.* The Congress and the several States shall have concurrent power to enforce this article by appropriate legislation.

*Section 3.* This article shall be inoperative unless it shall have been ratified as an amendment to the Constitution by the legislatures of the several States, as provided in the Constitution, within seven years from the date of the submission hereof to the States by the Congress.

#### ARTICLE XIX.

The right of citizens of the United States to vote shall not be denied or abridged by the United States or by any State on account of sex.

Congress shall have power to enforce this article by appropriate legislation.

#### ARTICLE XX.

*Section 1.* The terms of the President and Vice President shall end at noon on the 20th day of January, and the terms of Senators and Representatives at noon on the 3d day of January, of the years in which such terms would have ended if this article had not been ratified; and the terms of their successors shall then begin.

*Section 2.* The Congress shall assemble at least once in every year, and such meeting shall begin at noon on the 3d day of January, unless they shall by law appoint a different day.

*Section 3.* If, at the time fixed for the beginning of the term of the President, the President elect shall have died, the Vice President elect shall become President. If a President shall not have been chosen before the time fixed for the beginning of his term, or if the President elect shall have failed to qualify, then the Vice President elect shall act as President until a President shall have qualified;

and the Congress may by law provide for the case wherein neither a President elect nor a Vice President elect shall have qualified, declaring who shall then act as President, or the manner in which one who is to act shall be selected, and such person shall act accordingly until a President or Vice President shall have qualified.

*Section 4.* The Congress may by law provide for the case of the death of any of the persons from whom the House of Representatives may choose a President whenever the right of choice shall have devolved upon them, and for the case of the death of any of the persons from whom the Senate may choose a Vice President whenever the right of choice shall have devolved upon them.

*Section 5.* Sections 1 and 2 shall take effect on the 15th day of October following the ratification of this article.

*Section 6.* This article shall be inoperative unless it shall have been ratified as an amendment to the Constitution by the legislatures of three-fourths of the several States within seven years from the date of its submission. [The text followed above is that of the 'Literal Print' edition issued by the Department of State in Washington, D. C., 1933.]

#### ARTICLE XXI.

*Section 1.* The eighteenth article of amendment to the Constitution of the United States is hereby repealed.

*Section 2.* The transportation or importation into any State, Territory, or Possession of the United States for delivery or use therein of intoxicating liquors, in violation of the laws thereof, is hereby prohibited.

*Section 3.* This article shall be inoperative unless it shall have been ratified as an amendment to the Constitution by conventions in the several States, as provided in the Constitution, within seven years from the date of the submission hereof to the States by the Congress.

*Amendments.*—In the Constitution as originally adopted, slight provision was made for the guaranty to the individual of a sphere of liberty not to be encroached upon by the Federal Government. To remedy this defect, the first Congress after the adoption of the Constitution passed and submitted to the States for ratification a series of ten Amendments, which were duly ratified and declared in force on Dec. 15, 1791.

The Eleventh Amendment was passed in 1793, and declared in force Jan. 8, 1798.

The twelfth Amendment was added in 1803,

and from then until the time of the Civil War no others were adopted.

The Thirteenth, Fourteenth and Fifteenth Amendments were embodied in 1865, 1868 and 1870, respectively, as part of the Government's Reconstruction policy, securing to the liberated slaves the benefits of citizenship.

The Sixteenth (Income Tax) and Seventeenth (Election of Senators) Amendments were adopted on Feb. 25 and May 31, 1913, respectively.

The Eighteenth (Prohibition) Amendment came into force on Jan. 16, 1920.

The Nineteenth (Woman Suffrage) Amendment was adopted on Aug. 28, 1920.

The Twentieth ('Lame Duck') Amendment: Ratification formally announced Feb. 6, 1933.

The Twenty-first (Prohibition Repeal) Amendment was adopted Dec. 5, 1933. See PROHIBITION.

A proposed Child Labor Amendment, passed by both Houses of Congress in 1924, had by January, 1939, been ratified by 28 states.

See CONSTITUTION, POLITICAL.

Consult N. D. Baker, *Progress and the Constitution* (1925); G. Bancroft, *History of the Formation of the Constitution* (2 vols. 1882); J. M. Beck, *Changed Conception of the Constitution* (1925); Viscount Bryce, *American Commonwealth* (2 vols. 1911); J. A. C. Chandler, *Genesis and Birth of the Federal Constitution* (1924); J. Elliot, *Debates in the Several State Conventions on the Adoption of the Federal Constitution* (5 vols. 1836-1845); E. M. Eriksson and D. N. Rowe, *American Constitutional History* (1933); M. Farrand, *Reports of the Federal Convention* (1911), including all the sources of knowledge of the secret sessions of the Constitutional Convention; J. Fiske, *Critical Period of American History 1783-1789* (1888); R. Foster, *Commentaries on the Constitution of the United States, Historical and Juridical* (1895); A. B. Hart, *Introduction to the Study of Federal Government*; S. E. Morison, *Sources and Documents Illustrating the American Revolution, 1764-1788, and the Formation of the Federal Constitution* (1923); W. B. Munro, *Constitution of the United States* (1930); C. E. Stevens, *Sources of the Constitution of the United States* (1927); F. J. Stimson, *Constitution As It Protects Private Rights* (1923); H. Taylor, *Origin and Growth of the American Constitution* (1911); S. B. Thomas, *Our Weakened Constitution* (1932); F. N. Thorpe, *The Essentials of American Constitutional Law* (1918); W. K. Wallace, *Our Obsolete Constitution* (1932); W. W. Willoughby, *Constitutional Law of the United States* (1910); Woodrow Wilson, *A History of the American People* (5 vols. 1902); *idem*, *Congressional Government* (1914); W. F. Willoughby's *The Government of Modern States* (1919); W. W. Willoughby's *The Fundamental Concepts of Public Laws* (1924); Munro's *American Government Today* (1930); and Burgess' *Recent Changes in American Constitutional Theory* (1923).

**Constitution, Political.**—The word constitution in its widest political sense means the establishment of a polity, or the enactment, by the sovereign power, of an articulate form of government. In this sense, most nations possess a constitution. A political constitution, in the strict sense, may be described as the body of rules which define the functions of the government and its departments, and which regulate the relations between the government and the persons governed. These rules may be written or unwritten. They may be embodied in 'fundamental' or 'organic' laws enacted by the supreme legislative power, as in the case of the Federal and State constitutions in the United States; they may take the form of statutes; or they may exist in the no less binding form of customs, traditions, or conventions.

The main objects of constitutional law are: to guarantee the rights and liberties of the community; to maintain an orderly and stable form of government; to organize the legislative executive, judicial, and administrative departments of government, and to supervise their action; to subordinate all these departments to the law of the land and the legally expressed will of the nation. These objects are seldom perfectly attained, for under several of modern constitutions, the government can sometimes infringe popular liberties and evade legal and national control. In all constitutions a representative chamber is an invariable feature, having in some instances a maximum, in others a minimum, of legislative powers. Common to constitutional government is also a cabinet.

**Constitutional Conventions.** A constitutional convention is a body of persons met, under authority of an established government, for the purpose of framing the fundamental law or constitution of a sovereign state, or for the purpose of reviewing and revising or recommending amendments to an existing constitution. The assumed necessity for the periodical review and possible revision of written constitutions in which the fundamental law is set forth has, in the United States, in both Federal

and State governments, led to provision in those constitutions for such conventions. A distinction must be made between persons acting under authority of an established government, and those who frame constitutions upon their own assumed authority. The latter are the product of revolution, and merely part of the apparatus of revolution. A notable example is the Continental Congress of 1777, which submitted to the colonies for ratification the Articles of Confederation. A legislative body has the inherent right, in the absence of constitutional restrictions or directions, to call a constitutional convention. The most famous, the Federal Convention of 1787, which drafted the Constitution of the United States, met pursuant to the call of a legislative body, the Congress representing the States then working under the Articles of Confederation. So, also, the constitutional conventions of most of the original States, which met after independence was accomplished, were chosen at the behest of the legislatures of those States.

See CONVENTION; CONSTITUTION OF THE UNITED STATES. Consult Bryce's *The American Commonwealth*; Cooley's *General Principles of Constitutional Law in the United States*; Dodd's *The Revision and Amendment of State Constitutions*; Hart's *Actual Government*; Hazen and Vincent's *Adoption and Amendment of Constitutions in Europe and America*; Jameson's *A Treatise on Constitutional Conventions*; McClain's *Constitutional Law in the United States*.

**Constitutional Union Party**, a political party in the United States which took part in the campaign of 1860, and which was in reality a temporary union of the remnant of the old-line Whigs and of the Southern 'Know Nothings,' who wished to avert the threatened conflict between the North and the South, and who were strongly opposed alike to disunion and abolitionism. A national convention held at Baltimore on May 9, 1860, twenty-two States being represented, adopted a resolution, the essence of which was that since partisan platforms 'had the effect to mislead and deceive the people . . . it is both the part of patriotism and of duty to recognize no political principle other than the Constitution of the country, the union of the States, and the enforcement of the laws.'

**Constitutions, Apostolic**, a series of eight books, containing church ordinances, attributed to the apostles, and said to have been written down by Clement of Rome. They were never accepted in the West, and in the

East were rejected by the Second Trullan Council (692). It is pretty generally agreed that Books I.-VI. are a working over of a *Didascalia* of the third century, which is extant in Syriac; Book VII. rests upon the *Didaché* of the second century; and Book VIII. upon Hippolytus. Internal evidence indicates a Syrian origin of the work. There is an English translation, with notes, by Donaldson, in vol. xvii. of *Ante-Nicene Library*.

**Consubstantiation**, the theory of impanation or substantial conjunction of the elements of bread and wine in the Lord's Supper with the elements of the body and blood of Jesus Christ. This doctrine may be said to stand between the transubstantiation doctrine of the Roman Catholic Church and the teachings of Calvin and Zwingli. As compared with the former, it is dualistic in that it recognizes the actual presence of both the earthly and heavenly elements in the Sacrament; as compared with the latter, it is objective in that it asserts the corporeal presence of Christ, rather than merely His spiritual presence in the Lord's Supper.

**Consuegra**, town, Toledo province, Spain. It has Roman remains; p. 7,600.

**Consul**, the name by which the two chief magistrates of ancient Rome were generally known, though various evidences show that the original title was 'prætor,' and it was only when a third prætor was added that the senior pair came to be known as 'consuls.' This consulship was instituted in 509 B.C., on the expulsion of the kings. Originally, patricians alone were eligible for the office, and it cost a struggle of more than a century before the Licinian law of 367 B.C. enacted that one at least of the consuls should be a plebeian.

The consul controlled the senate and the assembly, raised and commanded troops, imposed fines and even capital sentences, spent the public money without supervision, undertook public works of all sorts, and finally was irresponsible, except that he might be prosecuted as a private person. In practice, however, we find that, as a rule, the consuls merely executed the will of the senate. The symbol of their authority was the bundle of rods (*fasces*), with the axe in the centre, which was carried before them by twelve lictors.

In the later years of the republic—after 133 B.C.—the office was shorn of a good deal of its importance, and finally became a municipal magistracy or a sort of lord mayoralty, an office of no real power. As such it existed down to the latest days of the empire. The title of consul was revived in the French Republic

after the revolution of the 18th Brumaire, and lasted till the coronation of Napoleon as emperor (May 18, 1804).

**Consular Regulations.** For all goods imported into the United States amounting to \$100 or more, there must be taken out a consular invoice, which must be certified by the U. S. consul at the point of sale, manufacture, or shipment of the merchandise. The fee for each certification is \$2.50. Forms or blanks approved by the Treasury Department must be used in clearing merchandise. When properly filled out by the importer or his representative, they are filed with the consular invoice and bill of lading in the custom house, and duty is assessed at the appropriate rates, gauged from the invoice description. Appeals from the action of the appraiser are of two kinds—one an appeal from his valuation, the other from the duty suggested by him. These appeals are heard by a Board of General Appraisers, and in certain cases by the U. S. court of customs appeals at Washington.

**Consular Service.** A consul is an agent appointed by a government to reside in foreign countries for protecting the individual interests of its merchants, travellers, and mariners, and also for supplying information, through the government, for the guidance of trade and commerce. In addition, American consuls perform certain judicial functions, acting as probate judges and public administrators of the estates of deceased Americans leaving property within their jurisdiction, and recording deeds, bonds, wills, etc. By treaties with China, Turkey, and other Eastern Powers, American consuls have a general criminal jurisdiction over American citizens charged with crime in those countries; also civil jurisdiction in cases where an American citizen is party to the suit. Similar powers are exercised in the same countries by consuls of other nations. In France the consular service (based on regulations dating from 1836) is closely assimilated to the diplomatic service. In other countries the two are more clearly distinguished. In America agents with consular powers were appointed during the Revolution; and President Washington appointed a number of consuls. An executive order of 1895 provided for a system of examinations.

The Director of the Consular Service in the Department of State has general supervision. Consult Eli T. Shephard's *The American Consular Service*.

**Consulate of the Sea** (*Consolato del Mare*), a collection of maritime customs and observances held in high repute by early mariners. It was, so far as is known, first printed at

Barcelona in 1494, and was translated into English by Sir Travers Twiss as an appendix to *The Black Book of the Admiralty*.

**Consumers' Organizations.** (1) NATIONAL CONSUMERS LEAGUE, founded in 1899 to investigate, educate and legislate for promoting fair labor standards. (2) CONSUMERS' RESEARCH, INC., founded in 1927 to provide information and counsel to consumers. Publishes *Annual Cumulative Bulletin*. (3) CONSUMERS' UNION OF THE U. S., INC., founded in 1936 as a nonprofit research agency. Publishes *Consumer Reports*. (4) NATIONAL CONSUMER-RETAILER COUNCIL, INC., founded in 1937 to strengthen and encourage co-operation between consumers and retailers. Publishes series of leaflets.

**Consumption.** See TUBERCULOSIS.

**Consumption**, in economics, treats of the use of wealth, and is the converse of *Production*, which is the creating of wealth.

**Contagion**, the communication of a disease from the sick to the healthy, either by direct contact of the diseased part, or through excretions and exhalations.

**Contagious Diseases, Control of.** See **Public Health; Quarantine.**

**Contarini**, the name of a noble family in Venice, one of the twelve that elected the first doge. Between 1043 and 1684 eight doges were furnished by this family, which also included four patriarchs, and a large number of generals, statesmen, artists, poets, and scholars. The first Doge, DOMENICO (1043-71), began the rebuilding of St. Mark's. Among the men of learning were: AMBROGIO, ambassador to Persia; CARDINAL GASPARO, Venetian ambassador at the Court of Charles V., who labored to reconcile Protestants and Catholics and was sent to the Diet of Ratisbon; SIMONE (1563-1633), Venetian ambassador at several Italian courts, and Latin poet.

**Conte**, (French, 'tale' or 'story'), is really the artistic elaboration of an anecdote. Maupassant, Voltaire, Perrault's fairy tales, and the apologues of La Fontaine come under this classification.

**Contemporaneity**, in geology, has a more extended significance than in ordinary language. When a geologist speaks of the Silurian systems of America and Europe having been accumulated contemporaneously, he simply implies that each occupies the same relative position in the succession of systems. Each was preceded by a Cambrian and succeeded by a Devonian system; but it is possible that the Silurian period may have commenced earlier or endured longer in one area than the other.

**Contemporary Review**, founded in London as a 'theological, literary, and social' review in 1866 by A. Strahan, its first editor being Dean Alford, enlisted as contributors such men as Gladstone, Tennyson, Manning, Huxley, Morley.

**Contempt of Court** may be defined as any mode of conduct which implies disrespect toward the judiciary, or which show a deliberate intention to lower it in the public estimation, or to set at naught or abuse its power and authority. Contempt of court may be a ground for a prosecution or indictment.

Fair criticism of the manner in which a court conducts its proceedings is not regarded as a contempt—at any rate if the aim of such criticism is the public utility, and not the attainment of private ends.

**Content**, a document signed by the master of a ship setting forth the vessel's destination, the stores shipped, and other matters.

**Content**, a term employed in logic to indicate the aggregation of notions which constitute the meaning and are expressed in the definition of a given concept.

**Conti, Augusto** (1882-1905), Italian philosopher. Was born at San Miniato in Tuscany. He served as a volunteer against Austria; became professor of philosophy at Lucca, of the history of philosophy at Pisa, and of mental and moral philosophy at Florence. Conti's main endeavor was to reconcile the conflicting theories. His works include: *Evidenza, amore a fede, o i criteri della filosofia* (1862); *L'armonia delle cose* (1878); *Il vero nell'ordine* (1876).

**Conti, House of**, a younger branch of the Bourbon House of Condé. Louis of Bourbon, first prince of Condé, uncle of Henry IV., married (1551) Eleonore de Roye, who brought him Conti. The title was renewed in favor of ARMAND DE BOURBON.—FRANCOIS LOUIS DE BOURBON (1664-1709), his son, was a gallant soldier, who was elected king of Poland after the death of Sobieski (1697), but did not ascend the throne.—LOUIS ARMAND (1661-85), fought with Prince Eugene in Hungary.—LOUIS FRANCOIS JOSEPH (1734-1814), only son of Francois Louis (1717-76), was the last of the line. He lived during the Revolution, and died an exile before the Restoration.

**Contiguity, Law of**. See **Association of Ideas**.

**Continent**, a convenient popular term for each of the larger continuous areas of land on the earth's surface: Eurasia, Africa, North and South America, Australia, and Antarctica.

Continent is used in a wider sense to include the islands adjacent to these continuous land

masses. In this sense the British Isles are part of the continent of Europe, the Japanese islands part of Asia, and Tasmania and New Guinea of Australia. In the Mediterranean, however, the boundary must be arbitrary, as the structure on the lands on opposite sides of the Sicilian Strait and of the Ægean is homologous.

Continental areas are subject to considerable change through elevation or subsidence. Each continent has a mountain range for a backbone and seems to stand on ledge or terrace carved out by waves and called the *Continental Shelf*.

**Continental Congress**, the central body through which the English colonies in America acted in matters of common concern before and during the American Revolution. The name is also applied to the body, more properly designated the *Confederation Congress*, which met under the Articles of Confederation, 1781-9.

The first Continental Congress met in Philadelphia on Sept. 5, 1774, and was composed of delegates, chosen by irregularly convened assemblies and conventions, from all the colonies except Georgia. Although actually without legal status, it voiced officially the sentiments of the united colonies.

The second Continental Congress, which was convened on May 10, 1775, and continued with occasional adjournments, till March 1, 1781, was composed of delegates appointed by the colonies (States). At first acting as a centre for common consultation and protest, it soon assumed important administrative functions. It took necessary measures for the creation and administration of the Continental Army and for the carrying on of the war; it appointed a Committee of Secret Correspondence (Nov. 29, 1775), to which it intrusted the foreign relations of the colonies, and drew up and adopted (July 4, 1776) the Declaration of Independence.

The dates and places of actual meetings of the Continental Congress are as follows: Sept. 5—Oct. 26, 1774, Philadelphia; May 10, 1775—Dec. 12, 1776, Philadelphia; Dec. 20, 1776—March 4, 1777, Baltimore; March 4, 1777—Sept. 18, 1777, Philadelphia; Sept. 27, 1777, Lancaster, Pa., Sept. 30, 1777—June 27, 1778, York, Pa.; July 2, 1778—1781, Philadelphia. The meeting place of the Continental Congress, however, would uniformly have been Philadelphia but for the exigencies of the times. The presidents of the Continental Congress (1774-81) were successively Peyton Randolph, Henry Middleton, Peyton Randolph, John Hancock, Henry Laurens, John Jay, Samuel Huntington, and Thomas McKean.

Though primarily a temporary and deliberative body, the Continental Congress became, by the acquiescence of the people, a provisional government, until the Articles of Confederation gave Congress a constitutional basis. The Official proceedings may be found in the *Journals of Congress*. Consult J. Fiske's *Critical Period of American History*.

**Continental Shelf, Continental Ledge, or Continental Platform.** On a hypsometric map of the globe each continent is seen to be bordered by a submarine platform or ledge, termed the Continental Shelf. This shelf is really a part of the continental unit, and is beneath sea level because the seas more than fill the true ocean basins. The contour line of 600 feet is used to define the margin of the continental blocks. The Old and New Worlds are united by it in the Bering Sea and Strait, but Australia is separated from them by deep waters. It forms a wider platform round the north continents. The shallow seas of these continental shelves are the richest fishing grounds in the world.

**Continental System** was Napoleon's plan for shutting Great Britain out from all connection with the continent of Europe. Napoleon saw that if he were to be successful he must attack Britain through her trade. But the latter had command of the seas, and Napoleon's only resource was to forbid the importation of British goods into the Continent. This was the object of the Berlin Decree, to which Britain answered with the Orders in Council of 1807, practically declaring the Continent in a state of blockade, and forbidding all trade.

Most of the countries of Europe were coerced by Napoleon into joining the Continental System; but with the breaking up of Napoleon's power it fell to the ground. Consult *Cambridge Modern History*.

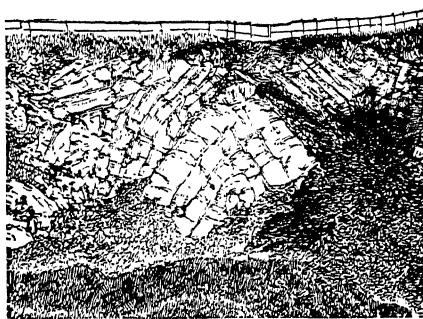
**Contingent Liability**, a liability which is dependent upon some future event. Thus, if a bank underwrites \$50,000 worth of shares in an issue by a new company, it incurs a contingent liability of \$50,000.

**Contingent Remainder**, a remainder so limited as to depend upon a condition which may not be fulfilled until after the determination of the estate upon which the remainder is limited. For example, if land is given to A for life, with remainder to the first son of B, and B has no son at the date of the grant, this is a contingent remainder, contingent on the birth of a son to B. As soon as a son is born, it becomes vested. See REMAINDER.

**Continuity**, in geometry, one of the most

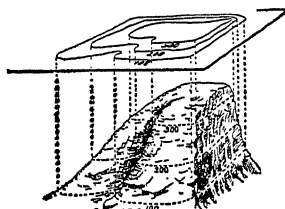
important properties of functions. By the principle of continuity, theorems concerning real points or lines may be extended to imaginary ones. The principle states that if a certain number of solutions come from the nature of a particular problem, there will be the same number from every case even though some may be imaginary. The sum of angles of a quadrilateral is a perigon whether the quadrilateral is convex, concave, or cross. This principle was first stated by Kepler. Consult Forsyth's *Theory of Functions*; Hobson's *Theory of Functions* (1907).

**Contorted Strata.** Among the rocks of the earth's crust, and especially those which are of greatest age, many have been subjected to great compression, which has thrown them into complicated folds, crushed them, and much



*Contorted Strata, as Seen in a Quarry.*

disturbed their bedding planes. Such rocks are said to be 'contorted'; and as the forces which produced these results are those which are active in mountain building, contorted strata are commonest in folded mountain ranges, such as the Himalayas, the Alps, the Appalachians.



*Contours.*

**Contour**, in physical geography, an outline. The form of the surface of the ground is commonly indicated on maps by *contour lines* drawn at fixed intervals, each passing through points at the same height above sea level.



Where the slope of the ground is steep, the lines lie near to one another, and recede as the slope becomes more gentle.

**Contraband of War** is a term of international law used to designate goods which are useful in operations of war, and which are liable to confiscation by a belligerent when in transit to a destination in the enemy's country. All goods may be divided into three classes, *viz.*, *contraband*, which are useful solely for war purposes, such as arms, ammunition, military clothing, etc.; *conditional contraband*, which are used for both war and peaceful purposes, such as coal, oil, provisions, etc.; *free goods*, which are used solely for peaceful purposes. But the lists of goods declared in a category during a war may change. International law states that neutral ships transport contraband goods at their own risk.

A neutral vessel is liable to seizure and condemnation for carrying contraband goods. But it has not been the custom for prize courts to condemn the vessel if the contraband was a very small part of her cargo, especially if the owners (or charterers) and captain were unaware of its character.

Conditional Contraband goods have been a cause of much dispute. Most of the Continental nations have opposed such designation, and have divided all goods into contraband and free. By the British and French orders of July 7, 1916, all commodities directly or indirectly of use to the enemy were declared absolutely contraband.

Upon the outbreak of the European War, Sept. 1939, both the Allies and Germany issued lists of Contraband which included textiles and food as well as munitions or machinery of use to the armed forces. Harassed by submarine and mine warfare, in Nov. 1939 England declared all goods, originating in Ger., Contraband and subject to seizure.

Consult H. W. Halleck's *International Law* (1908); W. E. Hall's *Rights and Duties of Neutrals*, and *International Law* (1910); Admiral Stockton's *Outlines of International Law* (1915); A. B. Hall's *Outline of International Law* (1915).

**Contract.** A contract is a promise or agreement enforceable at law, either oral, or in writing, or under seal. When under seal it is called a *specialty*, otherwise it is a *simple* contract. Everything in connection with the formation of a contract is governed by the law of the place where the contract arises.

Under the *Statute of Frauds* which is in force in most of the United States in one form or

another, certain contracts must be in writing. Only such persons as are mentally competent in the eyes of the law may make a contract.

A very important question in contract is that of *conditions*. These may be express or implied, and the performance of a condition must always be alleged. (See *CONDITION*.)

Certain contracts are void because of illegal subject matter, and sometimes voidable for the same reason. Gambling contracts are illegal in most jurisdictions; so are contracts in restraint of trade, or to commit a crime. Where one party breaks his promise, the other may treat the contract as terminated.

Consult Langdell's *Summary of Contract*; Pollock's *Principles of Contract*; Anson's *Principles of the Law of Contract*.

**Contractility.** See *Muscle*.

**Contract Labor.** Since the first settlement of America, scarcity of labor has led to devices for importing cheaply paid labor from Europe, under agreement to work for a specified time to repay passage money. In the colonial period the importation of contract laborers assumed extensive proportions. Such laborers, known as indentured servants, were bound out for periods varying from three to seven years, according to the efficiency of the laborer and the expenses incurred in bringing him to the colonies.

By Act of Congress of Feb. 26, 1885, it was declared unlawful for any person, company, or corporation to prepay transportation or in any way aid aliens to immigrate into the United States under express or implied contract to labor.

**Contract Notes, Bought and Sold Notes, or Advice Notes**, are memoranda sent by a broker or agent to his principal, informing the latter of a sale or purchase of goods or stock on his behalf. These are valid evidence of the transactions therein referred to.

**Contralto**, sometimes termed *alto*, the name given to the lowest or deepest variety of the female voice.

**Contrat Social**, ("Social Contract"), is the title of the chief work (1762) of J. J. Rousseau, and is descriptive of the doctrines of a school to whose views of the origin of society Rousseau gave expression. The English philosopher Thomas Hobbes was practically the first exponent of the view that society originated in a contract made by free individuals with each other, by which, in order to obtain certain obvious advantages, they abandoned their primitive freedom in the state of nature. It was not until it came to be believed that the age

of freedom had been a golden age that the revolutionary aspect of the doctrine became important through Rousseau's work.

**Contravallation, Lines of**, form a chain of works around a besieged place to resist the sorties of the garrison.

**Contrayerva**, a medicine once in much repute against snake bites. It consists of the root stocks (rhizomes) of different species of *Dorstenia*, a tropical American plant of the natural order Artocarpaceæ.

**Contreras, Battle of**, (Aug. 19-20, 1847), in the Mexican War, forms one of three engagements, the other two being at Churubusco and San Antonio, fought by Gen. Winfield Scott on his march from Veracruz to the City of Mexico. The American forces numbered 4,500, of whom less than 100 were killed and wounded; the Mexicans, about 19,000, of whom over 1,500 were killed or captured.

**Contribution**, in general, the act of giving conjointly with others. In a military sense, contribution indicates the imposition, by an enemy, of a levy upon the citizens of a town or country for forage, conveyances, etc., for the use of invading troops.

**Contrition**, or sorrow for sin, in Roman Catholic theology, 'with a firm purpose of not sinning in the future.'

**Controller Bay**, at the mouth of the Bering River, Alaska. In his message to Congress President Taft declared that 'it lies about 25 miles from very valuable coal deposits,' and that the construction of a railroad would materially assist the development of Alaska.

**Contusion**. See **Bruises**.

**Conularia**, a genus of fossil shells which resemble cones open at the base.

**Conundrum**, a kind of riddle, usually in the form of a question, the answer to which involves a pun.

**Convection Currents**. See **Expansion**.

**Convent**. See **Monastery**.

**Conventicle**, (Latin *conventiculum*, a diminutive of *conventus*), originally a cabal among monks, was given as an appellation of reproach to meetings of the English and Scottish Non-conformists in the seventeenth century. The Conventicle Act of 1664 was passed for their suppression.

**Convention**, in general usage, a rule of conduct established by custom or agreement; in diplomacy and in military affairs, an international compact or agreement other than a treaty; in a political sense, an extraordinary gathering of representative delegates for a definite purpose.

*Political Conventions*, in the United States

are local, State, or national assemblies of representatives of the various political parties for the express purpose of selecting candidates for elective offices. See **ELECTIONS**; **REPRESENTATION**; **REPUBLICAN PARTY**; **DEMOCRATIC PARTY**. Consult J. Bryce's *American Commonwealth* (1914).

**Convergence**, in mathematics. See **SERIES**.

**Convergence**, in biology, a term used to designate the appearance in two forms, not nearly related, of similar characters, which have been developed as an adaptation to similar conditions, and are not derived from a common ancestor.

**Conversano**, town, Italy, has a fine thirteenth-century cathedral and ancient castle. Wine and oil are exported; p. 13,000.

**Converse, Florence** (1871- ), American author, born in New Orleans, La.; graduated from Wellesley College. On staff of *Atlantic Monthly*, 1908-30; author of novels, short stories, poems. Among recent works are *Sphinx*, *Efficiency Expert*.

**Converse, Frederick Shepherd** (1871-1940), American composer. His opera *The Pipe of Desire* was the first work by an American to be performed at the Metropolitan Opera House, New York City. His works include operas, oratorios, symphonic poems; *Orchestral Fantasy 'Flivver Ten Million'*; *Tone Poem California*; *Suite for Piano From the Hills*; *Cantatas There were Shepherds Abiding in the Field, and I will Praise Thee, O Lord*; and various songs.

**Conversion**, a conscious change of heart prompting to a new life. The word is applied also to a change of creed.

**Conversion**, in law, is an unauthorized or unlawful taking of personal property and assumption of ownership over it.

**Conversion**, in logic, signifies that one proposition is formed from another by interchanging the subject and predicate.

**Converter**, a vessel used in the Bessemer process of making steel. See **CASTING**; **STEEL**.

**Convertible Paper Currency**, paper currency, chiefly of bank notes, which can be converted into cash on demand.

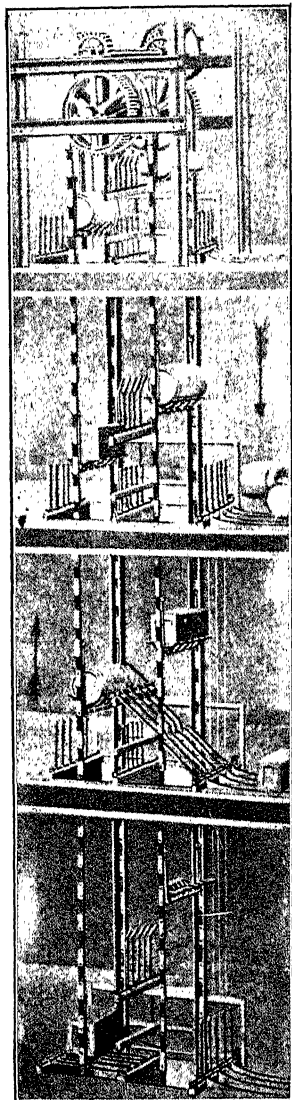
**Convex Lens**. See **Lens**.

**Conveyancing** may be defined as the art of creating, transferring, and extinguishing legal rights over real property. Sometimes it is used with reference to rights over personal property also. The instrument of conveyance by which real estate is transferred is known today as a *deed*. It should contain the names of the parties; words of conveyance describing the tenure, as to A, or to A and his heirs forever, by

which a fee would pass, or to A for life, etc.; describe the property accurately; and may contain certain covenants on the part of the grantor or as a covenant for quiet enjoyment, or a war-

strument known as a *bill of sale*, which is less formal than a deed. Consult L. A. Jones' *Forms in Conveyancing*; Brewster's *Conveyance of Estates in Fee by Deed*.

**Conveying and Elevating Machinery,** various types of equipment used in the transferring of material in bulk or package, either horizontally or vertically. There are many types of these in use from simple platform hoists to elaborate automatic elevators. There are steam, hydraulic and electric elevators.



*Straight Lift Elevator.*

ranty of the title. The instrument is dated, and is under seal, and in most States, in order to be recorded, must be witnessed or acknowledged before a notary or other proper officer. Personal property is sometimes transferred by an in-



*Elevator for handling barrels and boxes.*

A type of elevator used extensively in warehouses, flour mills and wholesale groceries for the handling of bags, boxes, barrels and miscellaneous articles, is the swinging tray or straight lift elevator shown in figure. It serves the double purpose of elevating and lowering the articles, which in all instances pass over the head of the elevator. Material may be taken from and delivered to any floor, and the receiving points are on the ascending side, and the discharge points on the descending side. This type of elevator consists of two strands of chain running in guides at its sides, and overhead and foot sprockets. The chains

are fitted at intervals with extended pins for carrying the trays, whose number, type and size for the capacity required depend upon the size and class of material to be handled. This same type, although generally used vertically, may also be run horizontally, being termed an elevator-conveyor. The trays always carry in a horizontal position, making it possible to carry fragile material and liquids in cans, pails or buckets. The chain used on the elevator-conveyor is, in most instances, of the roller type.

boot being scooped up by the succeeding buckets.

The continuous bucket type centrifugal discharge elevator, receiving the material directly into the bucket through a chute slightly narrower than the bucket, loads material directly into it, and saves the wear and strain of digging through the material at the bottom of the boot necessary in the case of the spaced bucket elevators.

The positive discharge type elevator is used for wet or sticky material. The

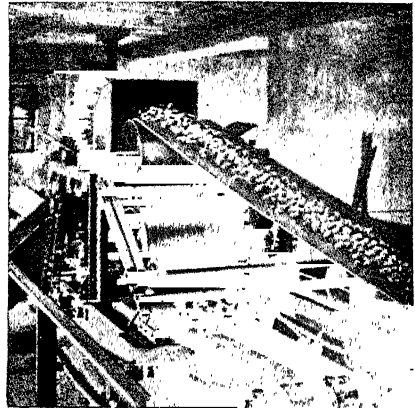


*Steel Apron Conveyors.*

Another type of elevator is especially adapted to handling large numbers of barrels, bags or boxes of uniform size. It may be loaded at any floor but discharges at one point over the head. It is entirely automatic and has large capacity. Another type is a barrel and bag elevator, which elevates and lowers articles at the same time, automatically delivering from the ascending or descending leg at any floor, but not taking the article over the head. On the descending side are skids for barrels, or specially designed unloading fingers for bags or boxes, so that they may be discharged away from the elevator opening.

*Bucket elevators* of various types are used in the handling of bulk material such as coal, coke, grain, ashes and the like. The spaced bucket type centrifugal discharge elevator travels at a speed which will throw the material from the buckets by centrifugal force when they pass around the head sprocket or pulley. The material passes into the ascending buckets at the top of the boot, the material that passes between the buckets and into the

buckets are fastened at their ends to a double strand of chain, which passes over sprockets



*Belt Conveyors.*

set back under the head sprockets, causing the bucket to invert when dumping over the

discharge chute, and giving a positive discharge.

The commonest arrangement of one type of conveyor is a rectangular circuit for steam power-house, coal being lifted in the ascending vertical run and discharged into the bunkers as it is carried along the top horizontal run. When not being used for coal, ashes are carried along the horizontal bottom run, up the ascending vertical run into an ash bunker from which they can be readily drawn off.

*Belt Conveyors* are devices widely used by many diversified interests. They may be operated successfully on an incline. Belt conveyors may receive material at several points from movable loading hoppers, and discharge at any point on either side of the belt along the line of travel through trippers on the horizontal run. The trippers may be any one of three types: stationary, hand-propelled, or self-propelled automatic reversing. The correct feeding of the material to be conveyed on to the belt adds to its life as well as maintains full capacity. The belt should receive its load in the direction the belt is travelling, and at a speed as near the belt speed as possible. In the handling of bulk material such as coal, coke or stone, sand or grain, a troughed belt is used.

Magnetic separator pulleys are used in many instances where it is necessary to separate pieces of iron which may have been picked up with the material handled, and prevent them from entering grinding or crushing machinery. Flat steel belts are adapted to the handling of coal, cement and products of like nature where it is required to discharge at several different points, and where space does not allow of the use of trippers.

Steel apron conveyors are used extensively for feeding at a uniform rate crushers or other conveyors from railroad track dump hoppers. Coal, ore, stone and ashes are the principal material handled.

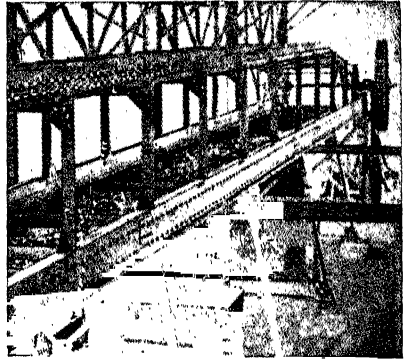
The *Pan conveyor* is made up of a series of steel pans overlapping one another and of a shape and depth to carry the desired load.

*Apron conveyors* for the handling of boxes, bales, barrels and miscellaneous packages, are used extensively in the assembly of parts in automobile plants and other plants where high production of one class of material is manufactured. Since this type of conveyor is reversible, material may be carried in either direction and receive and discharge at any point along the horizontal line of travel.

The *Scraper conveyor*, one of the oldest types of conveyors, is also one of the most dependable. It handles material horizontally and on

steep inclines up to 45 degrees, where it would be impossible to use an apron or belt conveyor. It is also admirably adapted for use as a retarding conveyor at coal tipples where hundreds of tons of coal are lowered down steep inclines. It is simple in construction, has few moving parts, and is easily kept in repair.

The *Portable conveyor* is a modification of standard types of conveyors, belt, apron and scraper, and bucket elevators. In the large cities where heavy snow storms occur, this type of conveyor has been found to be very efficient in the loading of snow into trucks and wagons. It requires little attention at the feeding end, being practically self-loading and discharging directly into the wagons or motor trucks. The method of operation is generally by an electric motor.



*Scraper Conveyor.*

*Spiral or screw conveyors* are adapted to the use of loose, fine bulk material such as coal, sand, ashes and grain; also for fine and dusty materials, as the trough or box may be totally enclosed.

The *Cable conveyor* is primarily used in the handling of large quantities of bulk material such as pulp wood, logs, and saw mill refuse.

The *Drag Chain conveyor* is especially adapted to the handling of ashes under boilers, clinkers in cement plants, and other abrasive materials, where the capacity required is not large.

*Gravity Carriers*, as the name implies, are used in the transferring of materials from one point to another by gravity at a fixed grade, the material itself moving over the conveyor. When it is required to lower the commodity from floor to floor, spiral roller or steel chutes are used.

The *Spiral Roller*, due to the slight grade required, and the number of turns necessary for

slow and easy descent, gives the advantage of allowing for storage, and also for the handling of open boxes without spilling the contents.

*Power Drag scrapers* consist of bottomless scraper buckets which are pulled back and forth by means of wire cables operated by double-drum hoists. They are used extensively on all types of excavating. See EXCAVATION and EXCAVATORS. Consult *Material Handling Cyclopedia* (1921); Zimmer's *Mechanical Handling and Storing of Material* (1922); Broughton's *Electric Handling of Materials* (1923).

**Convict Labor**, a term applied to work done by inmates of penitentiaries. It is now generally conceded that a convict should be kept at work both for his own good and for the good of the State.

In the United States there are several systems under which convicts are employed, chief of which are the Contract System, the Piece-Price System, the Public Account System, the State-Use System, the Public Works and Ways System, and the Lease System.

Under the contract system the State feeds, clothes, houses and guards the convict. A contractor engages the labor of the convicts, supplies the raw material, superintends the work and pays the State a certain amount per capita for the convicts' services. The work is usually performed within or near the penitentiary. In 1909 the National Committee on Prisons and Prison Labor was established for the purpose of studying the problem of labor in prison and causing the abolition of the contract system which is rather generally losing ground. The piece-price system is merely a modification of the contract system, in which the contractor pays the State a certain amount for the work done on each piece manufactured by the convicts. Prison officials usually supervise the work and dictate the daily quantity. About two-fifths of the States have either of these two systems.

In the public-account system the State buys the raw material, manufactures and puts the product on the market, and sells it either direct or through an agent. It has the entire care and control of the convicts. This system is found in all but two States and the District of Columbia, but in several of them it is practically negligible. In the State-use system the method is much the same as the public-account system but the use or sale of the product is limited to its own or other State institutions, the idea being that the State shall not compete with manufacturers employing free labor. The system is in use in all the States. The public works

and ways system is very like the State-use system except that instead of manufacturing articles for use it employs the convicts in construction or repair of the prison and other public buildings, roads, highways, and parks. It is found in 28 States and in the District of Columbia.

Under the lease system, which is now practically obsolete, the State leases the convict to a company or individual to feed, clothe and house and to pay the State a specified sum for his labor. This system was open to great abuse and has generally disappeared.

Consult *Bulletins* of the U. S. Department of Labor, Bureau of Labor Statistics; *Reports* of the National Committee on Prisons and Prison Labor; Whitin's *Penal Servitude*.

**Convocation**, a deliberative assembly of the bishops and clergy in the Anglican Church. The clergy first established a representative assembly near the beginning of the 13th century. A session of the governing bodies of the University of Oxford is also known as Convocation.

**Convolvulus**, or **Bindweed**, a genus of shrubs and herbs, chiefly climbers or trailers, of wide distribution. The flowers are funnel-shaped, and of many colors. There are some 150 species. Consult L. H. Bailey's *Cyclopedia of American Horticulture*.

**Convoy** (Fr. *convoi*), the name given to ships of war sent to accompany unarmed vessels in time of war to prevent them from being captured or sunk. The name is also given to a body of troops escorting persons, goods, provisions, or munitions of war.

**Convulsionaries**, a name given to those of the Jansenists who were identified with the excesses committed at the cemetery of St. Mé-dard in Paris about 1730. It was said that miracles were wrought at the grave of a Jansenist priest, and such hysteria was manifested that the cemetery had to be closed.

**Convulsions**, involuntary muscular contractions.

**Conway**, town, Arkansas, county seat of Faulkner co; the seat of Hendrix College (Methodist), Central Baptist College, and the Arkansas State Teachers College. The manufactures include lumber, flour, cotton and cotton-seed oil. Dairying is important; p. 5,782.

**Conway**, town, New Hampshire; p. 3,651. North Conway, one of the main gateways of the White Mountains, is itself a beautiful resort. The town also includes Conway, Conway Centre and Kearsarge. Granite is extensively mined and there are lumber mills.

**Conway**, or **Aberconway**, market town,

Wales, Carnarvon, at the mouth of River Conway. The town is enclosed by a wall with gates and round towers. The castle, built by Edward I. in 1284, stands on a rock overlooking the river. The Cistercian Abbey, of which there are now no remains, was founded in 1185. The Elizabethan building, Plas Mawyr, dating from 1584 and said to have been inhabited by Queen Elizabeth, is the headquarters of the Royal Cambrian Academy of Art; p. about 6,500.

**Conway**, river, Carnarvonshire, Wales, follows a northerly course of 30 miles and falls into Beaumaris Bay. The valley of Conway is very picturesque.

**Conway, Hugh**, pseudonym of Frederick John Fargus (1847-85), author of *Called Back* (1883), a tale which sold by hundreds of thousands, and of other sensational novels.

**Conway, Moncure Daniel** (1832-1907), American lecturer and man of letters, born in Stafford co., Va. He was dismissed from a Washington pastorate for anti-slavery views and accepted a call from the Unitarian Church at Cincinnati, O., where he preached from 1856 to 1861, and edited *The Dial*. Conway's chief works are a *Life of Thomas Paine*, *Demonology and Devil Lore* (1878), *The Wandering Jew* (1881), and literary monographs. Consult his *Autobiography* (1905).

**Conway, Thomas** (1733-1800), an Irish soldier of fortune, who served on the American side in the Revolutionary War. Aside from leading the advance at Germantown, however, he rendered no services of importance, and is remembered only because of the 'Conway Cabal.' Washington having opposed his promotion to major-general, Conway intrigued with others to secure the removal of the commander-in-chief, in favor of General Gates. Though failing in this, he secured his coveted promotion. Soon afterward he wrote to Congress, threatening his resignation, which was forthwith accepted. A few months later he was wounded in a duel, challenged by General Cadwallader because of his abuse of Washington. Subsequently he re-entered the French service and became governor of the French East Indies.

**Conway, Sir William Martin** (1856-1937), English writer and mountaineer. He was Slade professor of fine arts at Cambridge, made many ascents in the Himalayas, traversed the entire range of the Alps, and explored the glaciers of Tierra del Fuego. He was knighted in 1895. His publications include *Woodcutters of the Netherlands in the Fifteenth Century* (1884); *The First Crossing of Spitzbergen* (1897);

*The Domain of Art* (1902); *Mountain Memories* (1920); *The Van Eycks and their Followers* (1921).

**Conwell, Russell Herman** (1842-1925), American clergyman. He practised law in Minnesota, was foreign correspondent for the *New York Times* and the *Boston Traveller*. He was pastor of Grace Baptist Church in Philadelphia (1881-9) and subsequently of the Baptist Temple in the same city. He founded Temple University. Dr. Conwell was known as an educator, author, lecturer, and philanthropist. It is said that by his famous lecture, *Acres of Diamonds*, he earned more than \$2,000,000, which he devoted to the education of boys. He also established and financed two hospitals, and in 1923 received the Edward Bok award of \$10,000, as the man who had done the greatest service for the city of Philadelphia during the previous year. He published many books.

**Cook, Albert Stanburrough** (1853-1927), American educator. In 1897 he was president of the Modern Language Association of America, and in 1906 founded the Concordance Society. Among his numerous publications are the following: *The Art of Poetry* (1892); *First Book in Old English* (1894); *The Historical Background of Chaucer's Knight* (1916). He edited *Yule Studies in English*.

**Cook, Clarence Chatham** (1828-1900), American art critic. A series of able articles on the American art exhibit at the Sanitary Fair in New York in 1863, published in the *N. Y. Tribune*, gained him a long connection with that paper as art critic. He published and founded (1884) and for several years edited *The Studio*.

**Cook, Sir Edward Tyas** (1857-1919), English journalist, was born in Brighton. He was the first editor of the *Westminster Gazette* (1893-6), editor of the *Daily News* (1896-1901), and during the World War was one of the heads of the official Press Bureau. He was knighted in 1912, and in 1917 was created K.B.E. His published works include *Literary Recollections* (1918-19).

**Cook, Frederick Albert** (1865-1940), American physician and explorer, was surgeon of the Peary Arctic expedition in 1891-92, and of the Belgian Antarctic expedition in 1897-99. In 1909 he acquired some notoriety by asserting he had reached the North Pole, a claim later disproved by the University of Copenhagen. In later life he was imprisoned for several years for his part in the promotion of an oil company. He wrote *Through the First Ant-*

*arctic Night* (1900) and *To the Top of the Continent* (1907).

**Cook, James** (1728-79), English mariner, was for eight years engaged principally in surveying the St. Lawrence and the coasts of Newfoundland. In 1768 he was sent to the Pacific, at the instance of the Royal Society, with an expedition to observe the transit of Venus. Having observed the transit from Tahiti, he voyaged westward, completing the first circumnavigation of New Zealand and charting the coast. Passing on to Australia, he surveyed the east coast northwards, and, sailing through the strait separating it from New Guinea, showed that these two lands were not connected.

The following year (1772) Cook received command of an expedition which was sent out to determine the extent of the reported southern continent. Sailing again to the south and east, in January, 1774, Cook's second voyage covered more than 20,000 leagues, and was the first circumnavigation of the globe eastwards. It was notable, also, for the measures introduced by Cook for the prevention of scurvy, then such a serious menace on long voyages.

In the next year he sailed again in command of an expedition to the Pacific, to seek a passage round the north coast of North America. Cook met his death at Hawaii, in consequence of some trouble with the natives, being murdered in attempting to reach his boat (Feb. 14, 1779). In 1874 an obelisk was erected on the site where he perished.

Consult *Life* by Kippis (1788), by Besant (1890), and by Kitson (1907).

**Cook, Joseph** (1838-1901), American lecturer on ethics, was born at Ticonderoga, N. Y. He began his popular 'Boston Monday lectures' at the Tremont Temple in 1874 and continued them with some interruptions until his death. In 1880-2 Mr. Cook made a successful lecture tour of the world. He published *New Defenses of the Lord's Day* (1900), etc.

**Cook, Thomas and Son**, English tourist agents. Thomas (1808-92) was born at Melbourne, Derbyshire. An office was opened in London with three assistants, one of whom was Mr. Cook's son, John Mason Cook (1834-99), who became the head of the firm in 1892. The firm has now a hundred offices in various parts of the world. The system of international tickets or coupons has facilitated foreign travel.

**Cooke, George Frederick** (1756-1811), English actor, born in Westminster. In London he acted in Covent Garden as the rival of Kemble. He came to the United States in

1810, and played in the principal northern cities, being received everywhere with great enthusiasm. See Dunlop's *Memoirs* (1813); Genest's *Account of the Stage* (1832).

**Cooke, Jay** (1821-1905), American financier, born in Sandusky, Ohio. He engaged, with great profit, in the promotion of railroad and canal enterprises, and in 1860 he founded at Philadelphia the well-known banking house of Jay Cooke & Co. During the Civil War he was the sole agent of the U. S. Government in negotiating the enormous government loans in 1863, 1864, and 1865. After the war Jay Cooke & Co. were leaders of the syndicate which handled the refunding of the public debt.

**Cooke, John Esten** (1830-86), American author, was born at Winchester, Va. He published a great number of novels, and several biographies and sketches of the war, besides much miscellaneous prose and verse for periodicals. His books include *The Virginia Comedians* (1854), *The Virginia Bohemians* (1880), lives of Stonewall Jackson and Robert E. Lee, and *Virginia: A History of the People* (1883) in the American Commonwealth series.

**Cooke, Philip Pendleton** (1816-50), American poet, brother of John Esten Cooke, was born at Martinsburg, Va. His lyric, 'Florence Vane,' is the best known of his poems.

**Cooke, Philip St. George** (1809-95), American soldier, born in Virginia. He served as a major of dragoons in the Mexican War. As brigadier-general in the regular army he served on the Federal side in the Civil War and in Mar., 1865, received the brevet of major-general for his services during the war. He published *Scenes and Adventures in the Army, or Romances of Military Life* (1856), etc.

**Cooke, Rose Terry** (1827-92), American poet, was born (Terry) at West Hartford, Conn., and was educated at Hartford Female Seminary. Soon after her graduation she began the composition of poems and sketches which made the name of Rose Terry a favorite one throughout New England. Her verses were published in various editions beginning with *Poems by Rose Terry* (1860) and ending with *Poems by Rose Terry Cooke* (1888).

**Cooke, Sir William Fothergill** (1806-79), English electrician, born at Ealing, Middlesex. In partnership with Professor Wheatstone (1837) he took out a patent for improvements in signals for railways. The single-needle apparatus was not, however, invented until 1845. See R. Sabine's *History and Progress of the Electric Telegraph* (1869); W. T. Jeans's *Lives of the Electricians* (1887).

**Cookery** is the art of preparing food for



the use of man, and though commonly understood to include the preliminary cleansing, dressing, and preparing of the food, and all processes by which foods are prepared for the table, it should strictly be limited to those processes which involve the application of heat to food.

The cooking of food has much to do with its nutritive value. Many articles which, owing to their mechanical condition or other cause, are quite unfit for nourishment when raw, are very nutritious when cooked. There are three chief purposes of cooking. The first is to change the mechanical condition so that the digestive juices can act upon the food more freely. Heating often changes the structure of food materials very materially, so that they are more easily chewed and more easily and thoroughly digested. The second object is to make it more appetizing by improving the appearance or flavor, or both. Food which is attractive to the taste quickens the flow of saliva and other digestive juices, and thus digestion is aided. The third is to kill by heat any disease germs, parasites, or other dangerous organisms it may contain. This is often a very important matter and applies to both animal and vegetable foods.

The first necessity for good cookery is a plentiful supply of water; this is used, first as a vehicle for heat, and secondly as a solvent. Soft water is better than hard, for the latter contains calcium salts, and sometimes magnesium salts also. In cooking most of the starchy foods water acts simply as a vehicle for heat and the chemical change involved in the bursting of the starch granule and the gelatinization of the contents, for starch, when heated with water, forms a paste which gives a jelly-like mass when cold. Dry heat acting on starch, as in baking, converts the starch into dextrine. As starch is insoluble, and dextrine soluble, it is obvious that cooked starch, in so far as it is converted into dextrine, is more readily digestible than raw.

In breads, cakes, pastry, and other foods prepared from flour, the aim is to make a palatable and lighter porous substance more easily broken up in the alimentary canal than the raw materials could be. Sometimes this is accomplished simply by means of water and heat. More often, however, other things are used to 'raise' the dough—such as yeast and baking powder. The baking powder gives off the gas carbon dioxide, and the yeast causes fermentation in the dough by which carbon dioxide is produced. This acts as the steam does, only much more powerfully.

When food is boiled in water, salt is sometimes added to the latter. This is done principally to improve the flavor of the cooked product. It also raises slightly the temperature of the boiling water, and it is said to counteract diffusion. In cooking fats and oils very little chemical change takes place provided the temperature is not too high. The protoid, *i.e.* the nitrogenous constituents of foods, although very similar in chemical composition, are varied in their forms; they therefore require different treatment at the hands of the cook. As digestion is a process of solution, it is obvious that soluble albumen is more easily digestible than coagulated; this fact should be kept in view in the cooking of eggs and meat.

Food is usually either boiled, baked, grilled, fried, or stewed. To cook a piece of meat by boiling, it should be plunged into the boiling water and kept at that temperature for from three to four minutes and then the pot or pan should be drawn aside and be kept at a temperature of 165° to 170° F. until the meat is cooked. Meat so cooked is more tender and palatable than when maintained at the boiling-point in the usual manner. Meats lose weight in cooking. A small part of this is due to escape of meat juices and fat, but the chief part of the material lost is simply water. The proportion of nutrients extracted in the broth is directly proportional to the length of time and the temperature of the cooking period. When meats are cooked by dry heat the losses sustained are much smaller than when cooked in hot water. Fish, with the exception of salmon and shellfish, are of much better flavor if allowed to remain for some time at a temperature below the boiling point. As eggs are albuminous foods, the same principles should guide the cook in preparing them.

When cooking vegetables the water should be kept at the boiling point; there is nothing in the chemical composition of green vegetables to suggest any other treatment. Cereals, which are from two-thirds to three-fourths starch, must be combined with a large amount of water to become digestible. The cooking should be long and thorough. In fact, it is hardly possible to overcook cereals.

Steaming is in many cases superior to boiling, both for meat and for vegetables. The temperature of the steam in an ordinary steamer is a little lower than that of the water below.

Stewing implies moist heat, a sort of sweating process. It is done with a small amount of water kept at considerably below the boiling point.

In theory, roasting and baking are the same thing, but in practice there is a great difference. They both consist in cooking by radiation. In the process of roasting before an open fire the volatile products escape, whereas in the oven they are reabsorbed by the hot meat, with the result that there is a decided difference in flavor between a roasted joint and a baked one. In roasting it was formerly considered desirable to secure a high temperature at first to sear the meat, and then a lower temperature to complete the cooking, but scientific research in 1934 proved this searing process of no assistance in sealing. During the whole process the meat should be basted with melted fat to prevent evaporation of the meat juice, or rather of the watery portion of it. In modern times, when the oven has almost entirely superseded the open fire, most so-called roasting is really baking. In cooking any kind of food in the oven the degree of heat should conform to the kind of food cooked.

In general, it may be said that small, thin portions of dough of any kind require less time and will bear higher temperatures than larger and thicker portions.

Broiling or grilling is practically the same process as roasting applied to smaller portions of meat. It is done over glowing coals or under gas with a high temperature at first, to sear the outside, and then a lower one to complete the operation. Pan broiling is done on a very hot griddle greased very lightly to prevent sticking.

True braising is a combination of stewing and baking. It is carried on in a special vessel, so arranged that, while the stewing is proceeding, the upper part of the vessel is heated with hot coals or embers, thus subjecting the meat to a partial baking. The meat is often seared over at first to prevent the escape of juices.

Frying consists in the cooking of food in deep fat, which can be heated to a higher temperature than water. Frying in small quantities of fat is properly called *sautéing* and is done in a shallow pan.

For purposes of cooking there are several kinds of stoves in use. Coal cook stoves are in general principle constructed like any stove or furnace but have an oven for baking. These stoves or ranges are probably the most common means of cooking in use to-day. Coal cook stoves require an oven damper which regulates the heated air so that it passes over the top of the oven, down the sides, under the bottom and up the back flue, heating the oven before it escapes.

Gas stoves consist of one or more burners, with or without an oven. They are easier to care for than coal stoves, more economical of time, and if properly used are generally less expensive to operate. They have been greatly improved in recent years and now replace coal stoves in the majority of homes where gas is available.

Kerosene and gasoline stoves are useful in summer and for emergencies. In summer camps and in places where there is no gas supply, the blue flame kerosene stove is satisfactory. It has one or more burners and an oven similar to a gas stove.

Cooking by means of electricity is becoming more and more common and, beginning with single devices such as a toaster or coffee percolator, the equipment has been enlarged until in many households complete electric ranges are in use. These ranges resemble gas ranges in form but are heated by means of wire coils through which the electric current passes. An electric plug attachment is used with small utensils like saucepans and toasters and can be connected with any convenient fixture.

The practice of fireless cookery has long been known to the peasants of certain parts of Europe, who cook much of their food by packing it boiling hot in covered vessels placed in some non-conducting substance, such as hay. This method of cookery has attracted much attention of late, and fireless cookers are now manufactured to meet all needs. Anything which requires long cooking may be prepared in a fireless cooker. Cereals, vegetables which require long, slow cooking, and meats, such as corned beef and ham, are particularly adapted to this style of cooking, and very satisfactory results are obtained. Cooking is, as a rule, done at too high a temperature, and results in the waste of both fuel and food. It would often be more economical to prepare food at a lower temperature, and cook it for a longer period.

In connection with the subject of Cookery the reader is referred to the articles in this work on the various foods and foodstuffs. See particularly the following:

Baking powder	Fat
Butter	Flour
Bread	Food
Canning	Foods, Preserved
Cereals	Fuel
Cheese	Meat
Diet and Dietetics	Milk
Digestion	Nutrition
Egg	Sugar

*Bibliography.*—Consult Mulligan's *Plain Cookery*; Richards' *The Chemistry of Cooking and Cleaning*; Barrows' *Principles of Cookery* (1914); Rose's *Feeding the Family* (1916); Isobel Cotton Smith's, *The Blue Book of Cookery* (1926); *The Boston Cooking-School Cook Book* revised by Alice Bradley.

**Cooking, Military.** See **Field Cooking.**

**Cook Inlet**, an arm of the Pacific Ocean in the Sitka District, on the southern shore of Alaska. In 1900 the Biological Survey of the Department of Agriculture made biological reconnaissances of Cook Inlet, adding materially to the scanty data in regard to its flora and fauna.

**Cook Islands**, otherwise known as the Hervey Archipelago, lie about midway between the Society and Navigator groups. Part are volcanic, part coralline. The principal islands are Mangaia, Atioui, and Raratonga. The islands were discovered by Cook in 1773-7, annexed by Britain in 1888, and made over to New Zealand in 1901.

**Cook Mountain** (Maori, *Aorangi*, 'Fleecy Cloud'), the highest mountain in New Zealand (altitude 12,349 ft.), in the center of the Southern Alps in South Island. The first practical ascent was made by Rev. W. S. Green in 1882; the first complete ascent by T. C. Fyfe in 1894.

**Cook Strait**, strait between North and South Islands, New Zealand, 90 m. wide, was discovered by Captain Cook in 1770.

**Cooley, LeRoy Clark** (1833-1916), American physicist, was born in Point Peninsula, N. Y. In 1874 he became connected with Vassar College, with which he was associated until his death, as professor of physics and chemistry. He is the author of a *Text Book of Physics* (1868); *Students' Manual of Physics* (1897), etc.

**Cooley, Thomas McIntyre** (1824-98), American jurist, was born in Attica, N. Y., and removed to Michigan in 1843, where he was admitted to the bar in 1846; became Professor of Law at the University of Michigan, 1859; was a justice of the Supreme Court of that State, 1864-85, and chief justice part of that time. He rose to great fame as a constitutional lawyer comparable with John Marshall. His works include *Constitutional Limitations which rest upon the Legislative Power of the States*, etc., frequently consulted; *Treatise on the Law of Taxation* (1876); *Principles of Law of Torts* (1878).

**Coolidge, Archibald Cary** (1866-1928), American educator, was born in Boston. He became an instructor in history at Harvard in 1893, assistant professor in 1899, and professor

in 1908. In 1911 he became director of the University Library. He was Harvard lecturer at the Sorbonne, Paris (1906-07), and Harvard exchange professor at the University of Berlin (1913-14), and in 1919 was attached to the Peace Conference at Paris. He is the author of *The United States as a World Power* (1908) and *The Origins of the Triple Alliance* (1917).

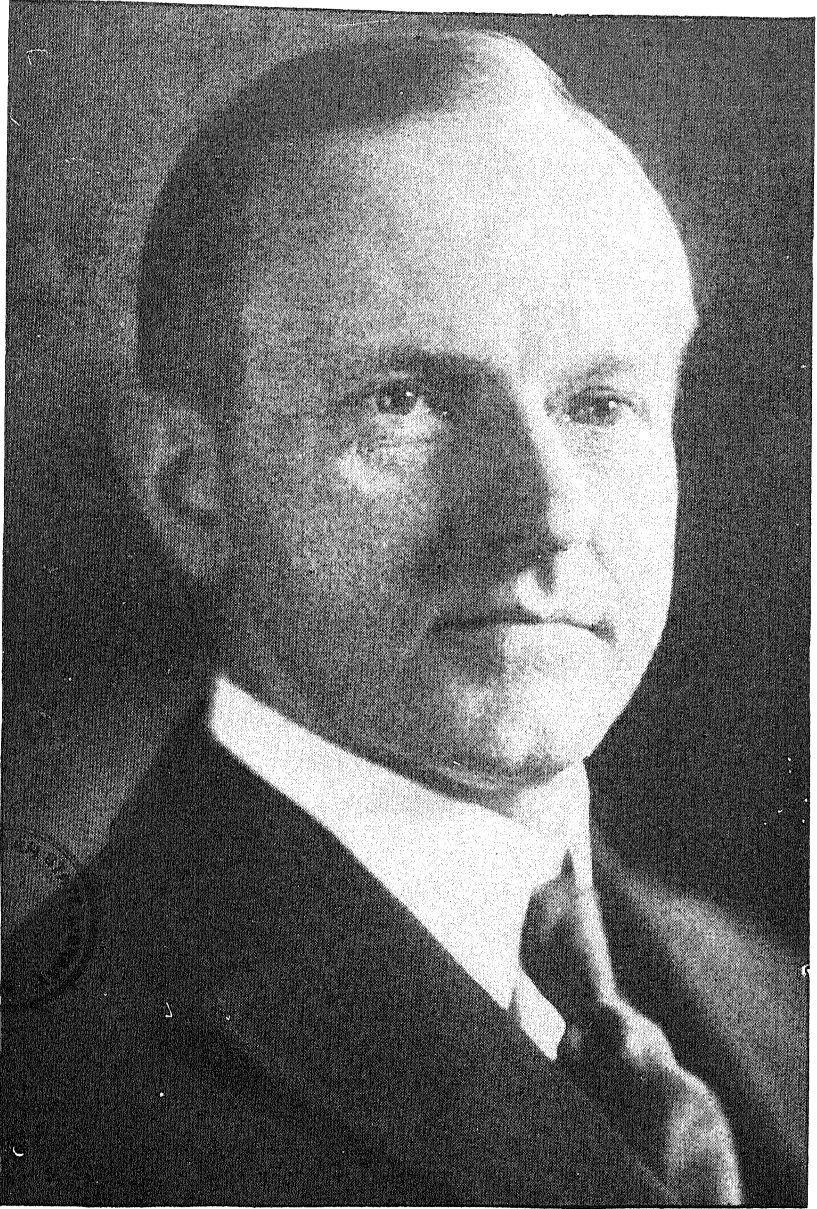
**Coolidge, Calvin** (baptized John Calvin) (1872-1933), thirtieth President of the United States, was born on July 4, 1872, in Plymouth, Vt. He was graduated from Amherst with high honors in 1895, and in 1896-97 studied law with the firm of Hammond and Field in Northampton, Mass., being admitted to the bar in 1897. In 1905, he married Grace A. Goodhue of Burlington, Vt. Two sons were born to them, John B., in 1906, and Calvin, Jr., in 1908 (d. July 7, 1924).

In 1907, Coolidge was elected to the Massachusetts legislature, after which he was twice chosen mayor of Northampton (1910 and 1911), and was elected a second time to the State Legislature (1912), three times Lieutenant Governor (1912-15), and twice Governor (1919-20). As a result of a strike by the police of Boston in September, 1919, he achieved a national reputation for steadiness and conservatism.

At the presidential election in November, 1920, Coolidge was elected Vice-President on the ticket with Warren G. Harding as President. On President Harding's death (August 2, 1923) Coolidge succeeded to the Presidency, the oath of office being administered by his father on August 3, at 2:47 A.M. In 1924 he was nominated and elected by a tremendous popular and electoral college vote.

On becoming President, Coolidge retained all but two of the Cabinet selected by Harding, which, because of the high renown of three of its members, was called the Cabinet of the 'best minds.' On March 28, 1924, he dismissed Attorney-General Harry Daugherty, who had been appointed for political reasons. A month earlier the Senate had adopted a resolution asking the President to call for the resignation of Secretary of the Navy Denby. Coolidge replied to the Senate that he could not recognize its right to make the request. On February 18, Denby brought the tension to an end by voluntarily resigning.

Coolidge's relations with Congress, beginning with the clash over Denby, were never cordial, despite the fact that during all the years of his incumbency of the Presidency his party had a majority in both Houses of Congress. In 1923 and again in 1925 he suggested



*Calvin Coolidge.*

legislation, based on the Hammond report, designed to prevent future strikes in the coal industry. He was ignored. In his first message to Congress, December 6, 1923 (delivered in person), he commended to the Senate the World Court as the only practical plan on which many nations have ever agreed, 'with the proposed reservations clearly indicating

refusal to adhere to the League of Nations.' When he left the White House the country was as far as ever from joining the World Court.

The disposition of Congress to go against the President's wishes extended to appointments, and the number of Coolidge appointees who were rejected by the Senate is probably greater than that of any other President. As a corollary to this Coolidge broke all precedents in the number of times he vetoed laws passed by Congress. From the beginning of his administration he had stressed the necessity of economy in Federal expenditures and most of his vetoes were for Congressional enactments calling for expenditures which he considered unwarranted.

On the constructive side, Coolidge's administration was marked by several achievements of first importance. A settlement was made providing for payments over a long period of years of the debts owed the United States by its War-time Allies, except France; the National debt was reduced by an estimated three-quarters of a billion dollars yearly and interest charges were greatly decreased through the issuance of low interest-bearing bonds in substitution for those issued during the War; Federal taxes were reduced three times; the budget system was put into effective operation as an incident to a general drive for economy and efficiency in the administration of the Federal Government.

In the field of foreign affairs, a more important achievement than the debt settlement was the concerting of a treaty (Pact of Paris) for the renunciation of war in the settlement of international disputes, which was signed at Paris, August 27, 1928, by the representatives of the United States and fourteen other nations.

Throughout all the years of Coolidge's tenure of the Presidency the country generally enjoyed a degree of prosperity unprecedented in all history, although conspicuous exceptions were agriculture and the coal and textile industries. In the summer of 1927 he issued his famous statement renouncing a third term as President: 'I do not choose to run for President in 1928.' On his retirement from office he engaged in literary work and also became a director of the New York Life Insurance Company. He died suddenly at his home in Northampton, Mass., on Jan. 5, 1933, and was buried in Vermont. Consult *Autobiography* (5th ed. 1931); White, W. A., *Calvin Coolidge* (1925); Woods, R. A., *Preparation of Calvin Coolidge* (1924); Rogers, C., *Legend of*

*Calvin Coolidge* (1924); *N. Y. Times*, Jan. 6, 1933.

**Coolidge, Charles Allerton** (1858-1936), American architect, was born in Boston. Among his notable buildings are Stanford University, Cal., the buildings of the Harvard Medical School, the Chicago Public Library, Chicago Art Institute, Merchants' National Bank, Boston, and buildings for the Rockefeller Institute, New York.

**Coolidge, Thomas Jefferson** (1831-1920), American manufacturer and diplomat, was born in Boston, Mass. He was president in turn of the Atchison, Topeka and Santa Fé Railroad, and the Oregon Railroad and Navigation Co. He was a delegate to the Pan-American Congress (1889), U. S. minister to France (1892-3), and a member of the joint high commission appointed to adjust various disputes between United States and Canada. Among his benefactions is the Jefferson Physical Research Laboratory at Harvard University.

**Coolidge, William Augustus Brevoort** (1850-1926), writer on Alpine subjects, was born near New York. Among his chief works are *Guide to the Central Alps of the Dauphiny* (1892), *Alpine Studies* (1912), *Johann Madutz* (1917), besides a number of Alpine guidebooks. He was editor of the *Alpine Journal* and of *Murray's Handbook of Switzerland*.

**Coolidge, William David** (1873- ), American physicist, was born in Hudson, Mass. From 1901 to 1905 he was instructor and professor of physical chemistry at the Massachusetts Institute of Technology, did research in physico-chemistry at the General Electric Company's laboratories, 1905-8, and since 1908 has been assistant director of the laboratories. Among his important inventions is the Coolidge tube (see VACUUM TUBES).

**Coolies** (Hindu kuli, 'laborer'), a term applied to Indian and Chinese laborers who emigrate to foreign lands, whether at their own or at the expense of the foreigner, to whom they bind themselves by contract to serve for a fixed term of years. Laborers who migrate from one part of India to another, as for instance from Bengal to Assam, are also called coolies. The European and American residents in the treaty ports of China give the same name to the lower class of Chinese laborers.

After the emancipation of the slaves in 1834, the negroes in the West Indies declined to work, and their places were supplied by free laborers brought from India and later from other Eastern countries. At first the movement was unregulated and was subject to

great abuses, natives being practically kidnapped into slavery; but gradually regulations and restrictions were introduced.

The whole system of coolie migration from India is under strict regulation by the British government. Emigration is permitted only through Calcutta, Madras, and Bombay, and every precaution is taken against fraud, and for the health and comfort of the coolies while on board ship.

In British Guiana the coolies form two-fifths of the population, and in Mauritius nearly three-fifths of it. Natal has coolies in the proportion of one in fifteen of its population. In British East Africa their arrival is welcomed. In the West Indies, in Trinidad in particular, they form so considerable an element of the population (one-third) that missionaries have been forced to make themselves proficient in Hindustani to enable them to reach the people. The coolie system is also in vogue in the Federated Malay States. The United States, Canada, and Australia all have laws restricting or forbidding the importation or immigration of Chinese labor. In this connection see IMMIGRATION.

**Cooper, Ashley.** See **Shaftesbury.**

**Cooper, Sir Astley Paston** (1768-1841), English surgeon, was born at Brooke Hall, near Norwich. He resigned his lectureship in surgery at St. Thomas' (held since 1792), and was prime mover in the establishment of the medical school at Guy's Hospital (1825), and in 1828 he was appointed surgeon to the king. His most valuable works are his splendidly illustrated *Hernia* (1804-7), and his *Dislocations and Fractures of the Joints* (1822). Consult *Life* by B. B. Cooper.

**Cooper, Charles Henry** (1808-66), English biographer and antiquary, was born in Great Marlow, Buckinghamshire, and from 1849 onwards was town clerk of Cambridge. He is the author of three works of first-rate importance: *The Annals of Cambridge* (5 vols. 1842-53); *Athenæ Cantabrigienses* (2 vols. 1858-61), suggested by Anthony à Wood's similar Oxford work; and *Memorials of Cambridge* (3 vols. 1858-66).

**Cooper, George Henry** (1821-91), American naval officer, was born at Fort Diamond, New York Harbor. He entered the U. S. Navy as a midshipman in 1837 and served in the Mexican War, taking part in the attacks on Tabasco and Tuxpan. In the Civil War, as commander he commanded the monitor *Sangamon* in operations against the fortifications of Charleston, S. C. He became a captain (1869), a commodore (1874), and a rear

admiral (1881), was president of the Board of Inspection (1877-80), and for some time before his retirement in 1884 was in command of the North Atlantic Squadron.

**Cooper, Henry Ernest** (1857-1929), American public official, was born in New Albany, Ind. He moved to Honolulu, Hawaiian Islands, in 1890. He was attorney-general of Hawaii at the time of the annexation of the islands by the United States in 1898 and their organization as the Territory of Hawaii in 1899, when he was appointed first secretary of the territory.

**Cooper, Jacob** (1830-1904), American Presbyterian clergyman and educator, was born in Butler County, Ohio. From 1866 to 1883 he was professor of Greek at Rutgers College, and he held the chair of philosophy at the same college from 1839 until his death. He wrote lives of George Duffield, Theodore Woolsey, and William Preston Johnson and other books.

**Cooper, James Fenimore** (1789-1851), American novelist, was born Sept. 15, 1789, in Burlington, N. J. In 1790 his father, William Cooper, removed with the family to Otsego Lake, N. Y., where he founded the village of Cooperstown upon a large tract of land secured a few years previously, and in 1799 erected the family mansion known as Otsego Hall. It was here that Fenimore Cooper gained the knowledge of frontier life and of Indian traits and character which are so truthfully portrayed in his *Leatherstocking Tales*. Fenimore received his education at Albany, N. Y., and at Yale. He then shipped before the mast on a merchant vessel by way of preparation for entrance to the U. S. Navy, in which he was appointed a midshipman in 1808. He served for three years, chiefly on the Great Lakes, and resigned in 1811.

Cooper's first novel, *Precaution* (1820), met with little success, but *The Spy* published the following year created such a furor that the author gave himself altogether to literary work. He removed to New York about this time, having published *The Pioneers* (1823), the earliest written of the Leatherstocking series. Their order in narrative is, *The Deerslayer* (1841), *The Last of the Mohicans* (1826), *The Pathfinder* (1840), *The Pioneers* (1823), and *The Prairie* (1827). Of these *The Last of the Mohicans* is by common consent Cooper's greatest work. Meanwhile *The Pilot* (1823-24), suggested by the lack of genuine sea-element in Scott's *The Pirate*, was the first book to bring Cooper enduring fame. He removed to Paris in 1826, whence he wrote for the *Na-*

tional on American topics. Returning to America in 1833, Cooper continued the writing of novels until his death in Cooperstown in 1851. He became involved in a series of libel suits and his later works do not show the inventive faculty of his earlier books on which his reputation rests.

Consult Griswold's *Prose Writers of America*; T. R. Lounsbury's *Life of Cooper*; Clymer's *J. F. Cooper*; J. Erskine's *Leading American Novelists*; H. W. Boynton's *James Fenimore Cooper* (1931); R. E. Spiller's *Fenimore Cooper* (1931).

**Cooper, Lane** (1875- ), American educator, was born in New Brunswick, N. J. In 1902 he became associated with Cornell University, where he was successively instructor in English (1902-06), assistant professor (1906-15), and professor (1915- ) of English language and literature. His publications include: *The Prose Poetry of Thomas De Quincey* (1902); *Methods and Aims in the Study of Literature*.



James Fenimore Cooper.

**Cooper, Peter** (1791-1883), American philanthropist, was born in New York City. He built (1830) the first locomotive in America, a tiny experimental engine for the Baltimore and Ohio Railroad, and later assisted in laying the first transatlantic cable. He formulated the scheme for 'giving instruction in branches of knowledge by which men and women earn their daily bread,' and 'The Cooper Union for the Advancement of Science and Art,' founded in New York in 1853, is the outcome (see COOPER UNION). In 1876 Cooper was Inde-

pendent candidate for the presidency. Consult Raymond's *Peter Cooper* (1901).

**Cooper, Samuel** (1798-1876), military officer, was born in Hackensack, N. J. He served as adjutant-general and inspector-general in the Confederate army. He wrote *A Concise System of Instructions and Regulations for the Militia and Volunteers of the United States*.

**Cooper, Susan Fenimore** (1813-94), American author and philanthropist, daughter of James Fenimore Cooper, was born at Scarsdale, N. Y. She was her father's secretary and amanuensis during the latter portion of his life, and afterward resided at Cooperstown, engaged in literary work and in the developing of a home for orphan girls. Miss Cooper's books are pleasantly observant of rural conditions.

**Cooper, Thomas** (1759-1840), British-American agitator, scientist, economist, and educator, was born in London and was educated at Oxford. In pamphlets and otherwise he publicly supported the French Revolution, and to avoid prosecution emigrated to the United States in 1795, and settled in Northumberland, Pa. From 1820-33 he was president of the College of South Carolina, where he also filled the chairs of chemistry and political economy. He was a conspicuous opponent of protectionism and did much to inculcate in the minds of South Carolinians theories and ideas which found expression in the nullification movement of 1832-3. He helped to prepare an edition of the statutes of South Carolina (10 vols., 1836-41), and published *Political Essays* (1800) and *Elements of Political Economy* (1826), and other volumes.

**Cooper, Thomas** (1805-92), English Chart-ist leader and poet, was born in Leicester. Settling in Leicester (1840), he became leader of the Chartists there, lecturing in the Pot-teries at the time of the riots of 1842; he was arrested for conspiracy and sedition, and sentenced to two years' imprisonment. During his incarceration he wrote his most famous work, *The Purgatory of Suicides*. This was published in 1845, and was followed by his *Wise Saws and Modern Instances* (1845) and other works. In 1855 he became an earnest lecturer upon the evidences of Christianity. In 1877 an edition of his *Political Works* appeared, and in 1885 he published *Thoughts at Fourscore and Earlier*.

**Cooper, Thomas Abthorpe** (1776-1849), British-American actor, was born at Harrow-on-the-Hill, England. His first appearance was made in Stephen Kemble's company at Edinburgh Theater and later he met with

great success at Covent Garden, London, particularly in Shakespearian rôles. He made his American début in 1796 as Macbeth at the Chestnut Street Theater in Philadelphia.

**Cooper, Thomas Sidney** (1803-1902), English painter, was born in Canterbury. After a youth of privation and struggle as coach painter, scene painter, and drawing master (1819-27), he studied animal and landscape painting in Brussels, where he found employment till the revolution of 1830. He exhibited in the Academy every year for sixty-nine years from 1834, being elected A.R.A. in 1845, and R.A. in 1867. Queen Victoria employed him to paint portraits of her prize cattle. Consult his *Story of My Life* (1892).

**Cooperage**, the art of making wooden casks, kegs, barrels, tanks, vats, and other circular or elliptical wooden vessels bound together by means of hoops. The industry is doubtless of great antiquity, as the use of such vessels has been described by writers as early as the beginning of the Christian Era.

There are two classes of cooperage: the 'tight,' which is concerned with the making of barrels for holding liquids, and the 'slack,' which produces vessels for dry articles, notably flour, sugar, and cement. The latter class is by far the larger and more valuable, but the former requires a higher grade of wood and greater accuracy of construction.

The cooper's product consists of three parts: the staves, headings, and hoops. Sometimes the manufacture of these parts is carried on in separate factories, but often a single establishment turns out the finished product. The best wood for staves in tight barrels is oak; in slack barrels elm is the favorite. Iron hoops have largely superseded wooden ones. At the present time machinery is employed almost entirely in barrel-making. The cement industry is the largest consumer, followed by the flour, sugar, and salt industries.

Consult Wagner's *Cooperage: a Treatise on Modern Shop Methods and Practice*; Newlin's *Tests of Wooden Barrels* (U. S. Dept. of Agriculture Bulletin No. 86, 1914), U. S. Dept. of Commerce's *Packing for Domestic Shipment* (1927).

**Cooperage**, the name given to the practice, eventually suppressed, of illicitly selling drink and tobacco to the fishermen engaged in the North Sea fisheries. The term is derived from the vessels, called *copers*, which carried on the traffic.

**Co-operation**. Broadly speaking, co-operation is any kind of joint effort for the accomplishment of certain results. Specifically the

term is applied to the combined effort of a number of persons—usually laborers, farmers, or small capitalists—to produce, purchase, or distribute goods for their joint benefit. The invention of steam-driven machinery was followed by the rise of political socialism, trade unionism, and co-operation. For a while all these movements were included under the general term, co-operation, but eventually trade unionism and political socialism developed into definite forms of their own (see SOCIALISM; TRADE UNIONS), and the co-operative movement became quite distinct from either of them.

One of its earliest advocates was Robert Owen, an Englishman, who about 1825 undertook the establishment of communistic colonies in which the colonists were to hold the land and work the machinery of production in common. These colonies met with little success. Dr. William King approached nearer the co-operative ideal. In 1827 he published a series of essays, which showed him to be a real prophet of the modern co-operative movement, and its progress and development have been along the very path he indicated nearly a hundred years ago. Other economic theorists, notably Fourier of France, early interested themselves in co-operative enterprises, but the practical pioneers of the movement are generally held to be the Rochdale weavers.

In 1843 twenty-eight weavers in the town of Rochdale, in the north of England, with a view to bettering their condition decided to establish a co-operative store to be conducted by the workers for the workers. In ten years the original membership of 28 had grown to nearly 1,000, the yearly business had grown from \$3,500 to over \$100,000, and Rochdale societies were springing up all over Great Britain. In 1864 the Co-operative Wholesale Society was formed, consisting of 54 societies representing 18,000 co-operators. In July, 1937, it included 1,084 societies with a membership of over 5,000,000.

In 1868 the Scottish co-operative stores, seeing the success of the English Wholesale Society, established a similar organization. The Irish Agricultural Wholesale Society, Ltd., located in Dublin, is the wholesale provider for the agricultural co-operative societies in Ireland. The Co-operative Union, Ltd., was established in 1869. It holds a yearly congress, and is the educational body of the British co-operative movement. During the early sixties the Rochdale system was adopted in some form in practically all countries and has continued to expand.



The outbreak of World War I had a stimulating effect upon the co-operative movement, and membership in societies increased enormously. The volumes of business of the English Wholesale Society almost doubled during the war, and this was true of Germany, Austria, and France. As for Russia, co-operation became the basis of practically the entire industrial system of Soviet Russia.

In 1895 was established the International Co-operative Alliance, an organization dedicated to the promotion of co-operative principles and their international practice. In 1931, 42 countries comprised it, with an individual membership of 70,000,000. Purely educational in nature itself, the Alliance has helped organize commercial central organizations of international scope.

The first attempt at co-operation in the United States was made in 1844, when a Boston tailor organized a co-operative buying club. This later became the first American co-operative society, and about it was formed a federation which in 1849 was known as the New England Protective Union. The last decade of the 19th and the early years of the 20th century showed a great lack of interest in the co-operative movement in America, but during the second decade and especially since 1916 there has been a revival. Toward the end of the war period many consumers' societies were formed. But the entire period following 1920 was marked by general economic and employment conditions inimical to the success of co-operative or private business. Consumers' societies include retail store societies, gasoline filling stations, distributive departments of marketing associations, creameries, restaurants, bakeries, boarding houses, and laundries. The largest consumers' society is the Franklin Co-operative Creamery Association, formed in Minneapolis in 1921 when the drivers of milk wagons and milk consumers united.

Co-operative credit societies and banks have increased in number. There are many fraternal life insurance associations which operate largely on a co-operative basis and make annual benefit returns, as well as co-operative fire, hail, and cyclone insurance companies. Several of the larger cities have co-operative housing associations, as well as co-operative telephone exchanges, motion picture houses, schools, and a co-operative undertaking establishment.

The indorsement of co-operation by the American Federation of Labor in 1917 proved a great stimulus to co-operative enterprise, which is developing in close alliance with the

labor movement. The first national convention of American co-operative associations was held in Springfield, Ill., in 1918, at which the National Co-operative Congress was organized, representing the commercial side of the movement. The Co-operative League of the United States represents the educational and propagandistic. A development of the 1930's was medical care co-operatives. By 1942 there were 35 such associations with a membership of 100,950.

An Agricultural co-operative society consists of producers of agricultural wealth who have combined, with the object of improving their financial status by performing some or all of the functions involved in transferring their products from themselves to the consumers, or by collectively buying farm supplies for jointly providing credit for productive purposes, or conducting some other business enterprise. Among the marketing functions are standardizing, assembling, selling, transporting, storing, financing, processing, and dispersing. In few instances do the organized producers attempt to perform all these functions. Standardizing and assembling are most frequently undertaken. As a general rule, separate organizations have been formed for the different commodities.

The origin of agricultural co-operation in the United States is sometimes traced to the establishment in 1841 of Brook Farm, but there is a great difference between that idealistic project and the modern agricultural co-operative association whose object is the economic betterment of the members through co-operative shipping and marketing and the co-operative buying of fertilizers, feed, seeds, and other necessities. Among the first farmers to combine for collective marketing were those with surplus milk. As early as 1851 the farmers in Oneida county, New York, banded together to make and market cheese.

The growth of agricultural co-operation in the United States can be measured by the increase in the number of associations, by the increase in membership, and by the increase in amount of business handled. The number of associations has increased from less than a score in 1860 to 15,000 in 1942; the membership from a few hundred in 1860 to over 3,500,000 in 1942; the amount of business handled from a few thousands of dollars in 1860 to \$2,800,000,000 gross sales in 1942.

Until comparatively recently, the co-operative movement consisted largely of the activities of local associations, though groups of local associations had in a few cases been com-

bined into federations which acted as sales agents for the members of the groups. Beginning about 1920, the 'large' association, serving the people of an entire State or a producing region which might lap over into several States, was promoted with vigor. State and regional associations for the marketing of cotton, tobacco, rice, wheat, peanuts, and potatoes were formed. At the same time, sales agencies, owned and controlled by the farmers, were set up in many of the terminal livestock markets.

A majority of the associations, with 70 per cent. of the total membership, are located in the North Central States; 700 associations in the South Central States are credited with 8 per cent. of the total membership; 1,100 associations in the Atlantic Coast States report a combined membership of more than 400,000, and ten Western States, with over a thousand associations reporting, has 256,000 members.

In December, 1922, the National Council of Farmers' Co-operative Marketing Associations was formed at a conference of co-operative marketing associations held in Washington, D. C. The American Institute of Co-operation was organized early in 1925 by representatives of seventeen educational and marketing organizations concerned with the welfare of the farmer.

In Canada, agricultural co-operation is confined largely to the marketing of grain, livestock, wool, poultry and poultry products, and dairy products. The wheat marketing associations in the Prairie Provinces are handling over one-half of the grain marketed.

Continental Europe has made progress along the line of agricultural co-operation, but its achievements as regards the selling of farm products do not involve so many farmers as are included in the American co-operatives. In Denmark the movement has reached large proportions. Agricultural co-operation in Ireland owes its inception to Sir Horace Plunkett through whose effort the Drumcollogher Co-operative Creamery Society was established in 1889. In 1900 a British Agricultural Organization Society similar to the Irish Society was formed in Nottingham. Its work was taken over by the National Farmers' Union. In 1905 a Scottish Agricultural Organization Society was inaugurated to stimulate interest in agricultural co-operation in that country. Belgium and Holland have both shown marked increase in agricultural co-operation during the past thirty-five years. More than half of Switzerland's agricultural associations are co-operative dairies. In Australia the government operated compulsory wheat pools during the

years 1915 to 1920. The National Union of German Agricultural Co-operative Societies (Raiffeisen) was founded in February, 1930. The modern co-operative movement was instituted in Japan by the government in 1900.

For co-operative credit and banking see RURAL CREDITS. See also PROFIT SHARING; FACTORY ORGANIZATION AND MANAGEMENT.

**Bibliography.**—For industrial co-operation, consult: Adams' and Sumner's *Labor Problems*; Webb's *Industrial Co-operation*; Mears and Tobriner's *Principles and Practice of Co-operative Marketing* (1926); Sorenson, *The Consumer Movement* (1941); Bolles, *The People's Business* (1942); *Consumers' Guide*, U. S. Dept. of Agriculture; *The People's Year Book*; *The Co-operative League Year Book*.

For agricultural co-operation, consult: Bulletins and Circulars of the U. S. Department of Agriculture; Jesness' *Co-operative Marketing of Farm Products*; Wolf's *Co-operation in Agriculture*; The U. S. Federal Farm Board's *Co-operation in Agriculture*, a bibliography (1931); H. Faber's *Co-operation in Danish Agriculture* (1931); *Year Book of Agricultural Co-operation*.

**Cooperia**, a genus of plants of the order Amaryllidaceæ. It includes two species: the Giant Fairy Flower (*Cooperia pedunculata*) and Evening Star (*C. drummondii*).

**Coopering.** See **Cooperage**.

**Cooper River**, river, South Carolina, rises in Berkeley county, and flowing south joins first with the Wando and then with the Ashley River at Charleston, forming Charleston Harbor.

**Cooper's Creek**, or **Barcoo River**, river, Queensland, Commonwealth of Australia, has two headwaters, the Thomson and the Victoria. In the rainy season the river drains southwest into Lake Eyre, South Australia, but in dry seasons it gradually dwindles away. In 1861, near the creek, the explorers Burke and Wills died of starvation.

**Cooperstown**, village, New York, county seat of Otsego co., situated on Otsego Lake at the source of the Susquehanna River, 62 m. w. of Albany and 33 m. s.e. of Utica. The historical associations of the village are centered in *Cooper Grounds*. Here, in 1769, the first white settler, Col. George Croghan, built a log hut, and on this site William Cooper, the founder of the town, built his first home and afterward erected Otsego Hall, the residence of his famous son, James Fenimore Cooper, who made Cooperstown the scene of several of his *Leatherstocking Tales*; p. 2,599.

**Cooper Union for the Advancement of Science and Art**, an institution founded in New York City by Peter Cooper in 1859, to provide free tuition in art, science and technology for the working classes. A large building was erected at the junction of Third and Fourth Avenues at a cost of \$630,000. An endowment fund was created by gifts of Peter Cooper, Edward and William Cooper, and Mr. and Mrs. Abram S. Hewitt, added to by a gift from Andrew Carnegie in 1900 of \$600,000. The Union offers day and evening courses in science, civil, mechanical and chemical engineering, architectural drawing, design, modeling and elocution. There is also a Woman's Art School and a library of over 60,000 volumes. During the winter months from November to April, free courses of lectures, under the auspices of the People's Institute, on varied topics are given in the Large Hall.

**Co-ordinates**, in geometry and applied science, may be defined as the quantities which determine the relative positions of the points, lines, surfaces, abstract or material, which build up the geometrical or mechanical system under consideration. We have the important system of co-ordinates invented by Descartes, and known as Cartesian co-ordinates. Then there are the polar co-ordinates of the astronomer, and the generalized co-ordinates of Lagrange, besides other systems useful in particular problems.

The first essential in all these systems is to choose a fundamental point of reference, from which as a starting point the whole system of measurements may be laid down. We shall call the point the origin  $o$  (Fig. 1). To deter-

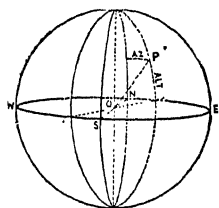


FIG. 1 (Co-ordinates).

mine the position of any other point  $P$ , we must know the distance  $OP$  and the direction of the straight line drawn through  $OP$ . If the distance only is given, the point  $P$  may lie anywhere on a spherical surface with center  $o$  and radius  $OP$ . If the direction only is given, the point may lie anywhere on the infinite straight line drawn through  $OP$ . When both are given, the point is assigned to the intersec-

tion of the spherical surface and the line drawn from  $o$  in the proper direction. Here the distance  $OP$  is one of the co-ordinates. But what co-ordinates are most convenient for determining the direction of a line in space?

It is necessary now to introduce, in addition to the origin or point of reference, certain lines or planes of reference, so as to give us a framework or scaffolding by means of which the direction of any line may be determined. The simplest and most direct way is first of all to draw through  $o$  and  $P$  a vertical plane, which will then be found to make a definite angle with the vertical plane running north and south. This angle we call the azimuth; and when it is assigned—positive if towards the west, negative if towards the east—the plane in which  $OP$  lies is determined. In order to fix the direction of  $OP$  in this plane we require to know the angle which  $OP$  makes with the horizontal line in this plane. This angle is called the altitude—positive if measured up, negative if measured down. Hence it requires two angles, the azimuth and the altitude, to determine the direction of a line in space. Thus to fix the position of  $P$  completely we need three numbers—distance, azimuth, and altitude. These are the polar co-ordinates. To determine the position of a point on the surface of the earth, the distance from the earth's center is implicitly given; and hence only two numbers are required—*viz.* the latitude and longitude, which are fundamentally the same in principle as the azimuth and altitude.

The same point may be fixed by using other systems of co-ordinates; but whatever system be used, three independent numbers are needed. For example, the point is fixed, or strictly speaking determined as one of two points, when its distances from three non-collinear points  $o, o', o''$  are given. Given the two distances  $OP, O'P$ , the point  $P$  must lie on the intersection of two spherical surfaces—*i.e.*, upon a circle. When the distance  $O''P$  is then assigned, the point  $P$  will be one of the two points of intersection of this circle with the third spherical surface. These two points lie on opposite sides of the plane  $oo'o''$ , and other considerations will determine which of these is the point required.

We now come to the Cartesian system of co-ordinates. Here the fundamental idea is to represent the position of a point in space as being determined by the intersection of three planes drawn parallel to given planes. The given planes of reference have the origin as their common point of intersection, and each pair will intersect along a line. There will be

three such lines of intersection, and the three constitute the system of co-ordinate axes, which are generally named the  $x$ ,  $y$ ,  $z$  axes (Fig. 2). They are represented in the figure by the lines  $ox$ ,  $oy$ ,  $oz$ , of which  $ox$  and  $oy$  are supposed to be in the plane of the paper,

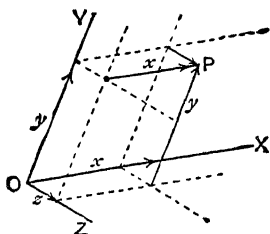


FIG. 2 (Co-ordinates).

while  $oz$  is drawn upwards, making an assigned angle with the plane of the paper. Each axis is the intersection of two planes, and each plane contains two of the axes. Suppose now that the  $yz$  plane moves outwards, keeping always parallel to itself, until it meets the point  $P$ . It will then have moved along the  $x$  axis through a distance  $x$ , which is called the  $x$  co-ordinate of the point  $P$ . Similarly, when the plane  $zx$  has moved outwards till it meets the point  $P$ , it will have moved along the  $y$  axis through a distance  $y$ , the  $y$  co-ordinate of the point  $P$ . In like manner we determine the  $z$  co-ordinate by translation of the plane  $xy$ . These three co-ordinates  $x$ ,  $y$ ,  $z$  completely assign the position of the point  $P$ , provided we make some convention as to the positive and negative directions of motion from the origin  $O$ .

In the great majority of cases the three reference planes are taken at right angles to one another, so that the co-ordinates  $x$ ,  $y$ ,  $z$  may then be most simply defined as the distances from the reference or co-ordinate planes  $yz$ ,  $zx$ ,  $xy$ . In this case it is easy to show by simple geometry that the square of the distance  $OP$  is equal to the sum of the squares of  $x$ ,  $y$ , and  $z$ , or

$$OP^2 = x^2 + y^2 + z^2.$$

Let us assign the condition that  $OP$  is of constant length  $a$ , then the equation

$$x^2 + y^2 + z^2 = a^2$$

represents the spherical surface with radius  $a$  and with its center at the origin.

If we confine our operations to one plane only, then we need concern ourselves only with two co-ordinates referred to two axes, which are generally known as the  $x$ ,  $y$  axes. With rectangular axes  $ox$ ,  $oy$ , the co-ordinates  $x$ ,  $y$  of any point are the distances of the point

from the  $y$  and  $x$  axes respectively. It is usual to study plane Cartesian geometry first, and then proceed to the geometry of space. The principles are, however, the same in both. The plane geometry is easier, because we are able to draw accurate figures, and so obtain a clearer picture of the meaning of the formulæ.

In all the ordinary processes of curve tracing and graphics, we use the ideas and processes of Cartesian co-ordinates; and there is certainly no more important method in the whole of geometry and dynamics.

The method of Cartesian co-ordinates has great advantages in physical applications, although for certain problems, such as those connected with the motions of the planets, polar co-ordinates are found more convenient. Also where rotations enter largely into the problem, as in the spinning-top and gyroscopic motion generally, it is almost self-evident that angles are the more appropriate co-ordinates. In many physical problems, however, the quantities which determine the state of a material system may be neither distances nor angles. They are none the less co-ordinates, and in almost all cases may be represented graphically as geometrical co-ordinates measured along assumed axes. Such, for example, are the pressure, volume, and temperature of any chosen substance in solid, liquid, or gaseous state. These are then the co-ordinates which determine the physical state of the mass of substance under consideration; and if we choose three mutually perpendicular axes with reference to which these quantities are measured, we obtain a surface each point on which is the symbol of that state for which the pressure, volume, and temperature have the volumes of the Cartesian co-ordinates of the point. We thus obtain James Thomson's thermodynamic surface.

**Coorg**, or **Kurg**, province, India, on the s.w. border of Mysore; area, 1,582 sq. m.; p. 163,838.

**Coornhert**, **Dirck Volkertsen** (1522-90), Dutch writer, was born in Amsterdam. He was compelled to flee to Germany to escape the Spaniards. In 1572, after Holland had thrown off the Spanish yoke, he returned and was nominated secretary of state of the Netherlands. He is celebrated both as a theologian and as a reformer of his native tongue. He translated the *Iliad* and works of Cicero and of Boccaccio, and wrote a work on ethics—*Zedekunst, dat is Wellevens Kunst* (1586)—and *Liedboek* (1575).

**Coorong**, **The**, an arm of brackish and shallow water, near the mouth of the Murray

River, Australia. It is nearly 100 m. long and has an average width of 2 m.

**Coos Bay**, an inlet of the Pacific on the coast of Oregon, north of Cape Arago. It is an important port for the export of coal.

**Coot**, or **Mud-Hen** (*Fulica*), a ralline marsh-bird widely distributed on inland waters throughout the northern hemisphere. The American species, *F. americana*, is found throughout North and Middle America and in the West Indies. The European coot, *F. atra*, found in most parts of Europe, Asia, and North Africa, is similar in appearance and habits.

**Cootie**, in army slang, the name, of unknown origin, given to the body louse (*Pediculus vestimenti*). See LICE.

**Copaiba**, or **Copaiva**, an oleo-resin obtained from the tree *Copaifera langsdorfi* (Leguminosæ) and other trees of the same species indigenous to Northern South America. It is a brownish-yellow liquid of varying consistency, with an aromatic odor and an unpleasant acrid taste. It is used medicinally.

**Copais**, ancient lake, in Boeotia, Greece, formed in the winter when the Cephissus overflowed its banks. The present drainage system has converted nearly 60,000 acres into fertile land, yielding two crops annually.

**Copal**, a resinous substance used in varnish making. It is obtained either from living trees or as a semi-fossil product, in the East Indies, South America, New Zealand, Africa, and Australia. A solution of fused copal in boiled linseed oil is used extensively as a varnish. The African variety (Mozambique and Zanzibar) is the most highly valued. See DAMMAR.

**Copalchi Bark**, the bark of a Mexican tree, *Croton niveus*, is much used as a substitute for cinchona in Mexico, where it goes by the name of *quina blanca*.

**Copalm**, the balsam obtained from the American Liquidambar or Sweet Gum Tree. See LIQUIDAMBAR.

**Copan**, ruined city of the Mayas, Honduras, Central America, on the Copan River, 30 m. s.e. of Chiquimula. The remains include monoliths, and parts of a great temple and truncated pyramids once crowned with *teocalli*, like those of ancient Mexico.

**Cope** (Lat. *cappa*), a long, cloak-like vestment, often of rich material and embroidered. It is semicircular in shape, reaching to the heels of the wearer, and open in front. Its most common use is as an ecclesiastical garment worn by the officiating priest in various solemn rites, particularly at vespers. In the Roman Catholic Church it is never worn by

the celebrant at mass, but the Anglican Church permits its use at communion.

**Cope, Sir Arthur Stockdale** (1857-1940), British portrait painter. His work is chiefly portraiture and includes portraits of Edward VII., George V., the Prince of Wales, Lord Kitchener, and the Archbishop of Canterbury. He was knighted in 1917.

**Cope, Charles West** (1811-90), English artist, was born in Leeds. He executed many of the frescoes and water-glass frescoes in the House of Lords. He also illustrated various fine editions of the poets and was a skilful etcher.

**Cope, Edward Drinker** (1840-97), American naturalist and comparative anatomist, was born in Philadelphia, Pa. He spent a number of years as palæontologist for various government geological surveys in Western territories, covering the district west and south of the Missouri River. From 1891 until his death he was professor of geology and palæontology at the University of Pennsylvania. Cope is said to have discovered nearly a thousand new species of extinct and quite as many recent vertebrates, accomplishing much for the classification of North American reptiles and amphibia. He acquired the *American Naturalist* in 1878, and was chiefly occupied with its editorship during the rest of his life. He was a leading advocate of the Lamarckian view of evolution, which he upheld in *The Origin of the Pittest* (1886) and *The Primary Factors of Organic Evolution* (1896).

**Cope, Sir John** (?-1760), British general, about whose early career little is known. He was commander-in-chief in Scotland when the rebellion broke out, in 1745, and was defeated at Prestonpans (Sept. 21) by the Highlanders.

**Cope, Thomas Pym** (1768-1854), American merchant, was born in Lancaster co., Pa. In 1821 he established the first line of packets between Philadelphia and Liverpool. He was active in bringing about the completion of the Chesapeake and Delaware Canal and in the construction of the Pennsylvania Railroad.

**Copeck**, or **Kopeck**, a Russian coin of which 100 make a rouble, the monetary unit. The copeck is worth about  $\frac{1}{2}$  cent. Copper coins of 1, 2, 3, and 5 copecks are issued.

**Copeland, Royal Samuel** (1868-1938), U. S. Senator, was born at Dexter, Michigan. He practised medicine at Bay City, Michigan, after having received his M.D. degree at University of Michigan, 1889, and studied abroad. 1895-1908 he was professor of ophthalmology, University of Michigan; 1908-1918 at the New York Flower Hospital; 1918-23 commissioner

of public health and president Board of Health, New York City. U. S. Senator, 1923 until death, 1938.

**Copenhagen**, capital and largest city of Denmark, is situated on both sides of the Kalvebod Strand, an inlet which separates the islands of Zealand and Amager and forms a fine harbor. Copenhagen proper is situated on the eastern coast of Zealand; the section on Amager is known as Christianshavn. Fortifications on both land and sea sides protect the city. Christianborg Palace, the residence of the king, stands on what is known as 'palace island,' in the southeastern corner of the city. It was originally built in 1733-45, was destroyed by fire in 1794, was rebuilt, again burned in 1884, and has been restored since 1907. To the northwest of Christianborg Palace is the Thorwaldsen Museum, containing a large collection of the master's work.

Copenhagen has an excellent harbor, and is the center of more than half of the trade of the kingdom. Large quantities of agricultural products are exported. The leading industries are shipbuilding, the manufacture of porcelain, sugar, and machinery, and brewing and distilling; p. 843,000.

Copenhagen is first mentioned (1043) as a fishing village, under the name of Hofn ('haven'). It was made a royal residence by Christopher II. (1443). The city has sustained many sieges—notably from June 10, 1523, to Jan. 6, 1524, by Frederick I., and from July 18, 1535, to July 28, 1536, in the Counts' Feud, on both of which occasions it espoused the cause of the banished Christian II. In 1658-9 its heroic and successful defence against Charles X. of Sweden contributed largely to the saving of the monarchy. Consult Rasmussen's *Copenhagen and Environs*; Michel's *Copenhague*; Hargrove's *The Charm of Copenhagen* (1911).

**Copenhagen Fields**, district in the northern part of London, England, celebrated for great meetings (Oct. 26, 1796, and April 21, 1834), memorable in the history of trade unionism. The site is now occupied by the Metropolitan Cattle Market, removed from Smithfield in 1885.

**Copepoda**, ('oar-footed'), an order of Crustacea, the members of which are either free-swimming, when they are often called water-fleas, or parasitic, in which case the body is much modified in shape, and the crustacean characters may cease to be apparent. Examples of the free-living forms are the freshwater Cyclops and the marine *Cetochilus*;

Caligus is a common parasitic genus. Consult Calman's *The Life of Crustacea*; Johnstone's *Conditions of Life in the Sea*.

**Copernicus, Nicolas** (1473-1543), celebrated Polish astronomer, was born in Thorn, Poland. In 1510 he became canon of Frauenburg, dividing his time between his religious duties, the practice of medicine, and his astronomical studies. In 1507 he began work on his great astronomical treatise, *De Revolutionibus Orbium Caelestium*, which was completed in 1530. The cardinal truth of the Copernican system of astronomy is that the sun is the center around which the earth and planets revolve. The Copernican theory was at first looked upon as heretical, and from 1616 to 1757 the Roman Catholic Church kept the *De Revolutionibus* on the Index of prohibited books, as being subversive of truth. Consult Prowe's *Life and Works of Copernicus*; Clerke's *Popular History of Astronomy*; biographies by Gassendi, Von Hipler and Polkowski.

**Copiapo**, town, Chile, capital of the province of Atacama, on the Copiapo River; p. about 12,000.

**Copiapo**, river, Chile, rises in the Andes, follows a northwesterly course for 150 m., and empties into the Pacific Ocean about 30 m. w. of the town of Copiapo.

**Copland, James** (1791-1870), British physician, was born in the Orkney Isles. In 1822 he became editor of the *London Medical Repository*. His publications include *Elements of Physiology* (1824) and his huge compilation, the *Dictionary of Practical Medicine* (1832-58). He was president of the Pathological Society.

**Copley, John Singleton** (1737-1815), American artist, was born in Boston, Mass., and early acquired a high reputation as a portrait painter. In 1766 he exhibited his *Boy and the Flying Squirrel* at the Society of Incorporated Artists' Exhibition, London, and in that same year was elected a fellow of the Society of Artists of Great Britain; in 1783 he became a member of the Royal Academy. He removed to England in 1774, and after a two years' tour of the Continent settled in London, and began the painting of historical pictures as well as portraits. Among the best of the former are the *Death of Chatham* (1779-80), *Repulse of the Spanish Batteries at Gibraltar* (1789-90). The excellence of these and other paintings is, however, surpassed by his richly-colored and well-modelled portraits. The famous portrait of the Copley family and portraits of John Quincy Adams, John Hancock, and Samuel Adams are to be seen in the Boston Museum of Fine Arts. Consult biographies by

Perkins and Mrs. Martha B. Amory; also E. Chesneau's *English School of Painting*; Tytler's *Modern Painters and their Paintings*; Bayley's *Life and Works of John Singleton Copley* (1915).

**Copley, John Singleton.** See **Lyndhurst, Baron.**

**Coppée, François Edouard Joachim** (1842-1908), French poet and dramatist, was born in Paris. For a short time he was a clerk in the Ministry of War, and in 1878 was made record-keeper at the Comédie Française, a post which he resigned on his election to the French Academy in 1884. He was made an officer of the Legion of Honor in 1888. His chief poetical works are *Intimités* (1867); *Les humbles* (1872); *Olivier* (1875); *L'Exilée* (1876); *Récits et élégies* (1878); *Arrière saison* (1887). His plays include *Le passant* (1869), *Mme. de Mautenon* (1881), and *Severo Torelli* (1883), and his tales *Une idylle pendant le siège* (1875), and *La bonne souffrance* (1900). Consult Druilhet's *Un poète François*, and Lescure's *François Coppée*.

**Coppée, Henry** (1821-95), American educator, was born in Savannah, Ga. He accepted the presidency of Lehigh University in 1866. He published text books on logic, rhetoric, and English literature, several military manuals, a military biography of Gen. U. S. Grant, and *The History of the Conquest of Spain by the Arab-Moors* (1881).

**Coppename**, river, Dutch Guiana, flows northward into the Atlantic Ocean, 40 m. w. of Paramaribo. It is navigable for 90 m.

**Copper** (Cu, 63.57), a metallic element occurring in various ores of world-wide distribution, and known from early antiquity for its valuable mechanical properties. The chief ores are of three classes—copper sulphides, native copper, and copper carbonates and oxides. They occur frequently in association with zinc and iron, and as a rule contain also small quantities of gold, silver, and lead.

Copper sulphides form the principal source of copper. Native or metallic copper is of comparatively rare occurrence, with the important exception of the Lake Superior copper region in Northern Michigan and the copper fields of Bolivia. It contains about 98 per cent. of the crude metal, frequently admixed with silver. Copper carbonates include Malachite and the allied mineral Azurite; while the principal oxides, found chiefly in connection with the carbonates, are Cuprite or the red oxide, and Tenorite or Melanconite, the black oxide.

As the various copper ores are usually disseminated in foreign rock matter known as

*gangue*, the first step in the extraction of the crude copper is the concentration of the ore.

Crude copper is extracted from its ores by two methods—dry processes or smelting in furnaces (pyrometallurgy), and wet methods or leaching (hydrometallurgy). In wet methods, if the solutions are of sufficient concentration and purity, electrolytic deposition of the metal is the usual method of recovery; otherwise chemical methods of precipitation are used, usually with scrap iron as the precipitating agent.

The treatment of the sulphide ores of copper generally begins with roasting in heaps, stalls, kilns, or furnaces, whereby a large part of the sulphur and the volatile impurities are oxidized and pass off in the waste gases. The roasted ore, containing much oxidized iron, is then smelted in a blast or reverberatory furnace with siliceous material, which yields a *matte* of copper, iron, and sulphur,  $x\text{Cu}_2\text{S.yFeS}$ , and a fusible *slag* of oxidized iron and silica. This method of smelting is known as the roasting and reduction process, and also as the German or Swedish process. With certain ores this was later largely replaced by the pyritic and partial pyritic processes, which combine roasting and reduction in a single operation.

The percentage of copper in the first *matte* may vary from 20 to 60 per cent. Formerly this first *matte* was re-roasted and fused one or more times for a higher grade *matte*, yielding at successive stages 'white metal' and 'blister copper.' This method has been largely superseded, especially in the United States, by the converting process.

Rich oxide ores are treated by mixing with sulphides, then smelting for *matte* and subjecting to the converter process. Wet methods of extraction are of limited application, being used chiefly with low-grade ores.

Refining of the crude copper obtained by smelting or leaching may be carried out in reverberatory furnaces, in which the crude metal is melted under highly oxidizing conditions and poled. In recent years, however, nearly all of the crude copper produced from sulphide ores and some of the Lake Superior product is refined electrolytically. (See ELECTROLYSIS.)

Copper is a reddish-colored metal of bright, metallic luster, highly tenacious, malleable, and ductile. It is an excellent conductor of heat and when pure it has high powers of electrical conductivity, ranking second only to silver in that respect. Copper forms with oxygen two important oxides, the cuprous or protoxide,  $\text{Cu}_2\text{O}$ , and the cupric, or monoxide,

CuO. These oxides unite with acids to form two classes of copper salts, cuprous and cupric. The former are of little importance; the latter are usually hydrated and of a green or blue color, soluble in water, possess a disagreeable metallic taste, and are poisonous. The best known of the cupric salts is Blue Vitriol.

Metallic copper is used for electrical, engineering, and general industrial purposes. Because of its high electrical conductivity it finds extensive application in the form of wire in telegraphy, telephony, electric traction, and lighting and as conductor bars in electrolytic plants. It is used also in shipbuilding and engine work, in the construction of railways, locomotives, and automobiles, for roofing purposes, in the manufacture of munitions, and for a great variety of heating and cooking devices.

Copper alloys are formed with gold, silver, tin, zinc, aluminum, and nickel, and these also find extensive application in the industries. They include brass, bronze, the various coinage alloys, German or nickel silver, gunmetal, aluminum bronze, cupronickel for bullets, Monel metal (see NICKEL), and babbitt metal for machinery bearings. (See ALLOYS.)

The principal copper areas in the United States are, in order of importance, the Bisbee district in Arizona, the Bingham district in Utah and Nevada, the Butte district in Montana, and the Lake Superior or Keweenaw district in Michigan. The mining of copper in the region of Lake Superior antedates the earliest visits of European explorers to the region, while the commercial production dates from 1845.

The copper mines of Chile have a vast excess capacity and in recent years six large copper mines have been discovered in Northern Rhodesia so that South America and Africa probably will supply the increases in future demand although the mines of the United States are far from exhaustion.

During World War I the production of copper was greatly increased owing to the use of this metal in the manufacture of munitions. During World War II copper headed the list of critical shortages in war metals and its production was once more expanding.

**Bibliography.**—Consult D. M. Levy's *Modern Copper Smelting* (1912); W. E. Greenawalt's *The Hydrometallurgy of Copper* (1912); H. K. Picard's *Copper* (1916); H. O. Hofman's *Metallurgy of Copper* (1924); U. S. Geological Survey's *Mineral Resources of the United States* (annual); *The Mineral Industry* (annual).

**Copperas**, the old name for ferrous sulphate or green vitriol, and used for the ferrous sulphate of commerce. It is made by dissolving iron in dilute sulphuric acid, and is obtained as a by-product in several manufactures. It is used in the preparation of ink and in dyeing.

**Copper Cliff**, town, Canada, in Sudbury District, Ontario. It has one of the largest nickel smelters in the world; p. 2,500.

**Copperhead** or **Highland Moccasin** (*Agkistrodon contortrix*), a poisonous crotaline snake of the Eastern and Central United States, closely allied to the moccasin snake. It is of moderate size, usually from 2 to 3 ft. long, with a rather thick body, and a short tail without rattles. While not aggressive, it will defend itself vigorously, and its bite, if well delivered, is extremely dangerous to life. From six to nine living young are produced at a birth.

**Copperheads**, a term of opprobrium, applied by Unionists during the Civil War to 'those who adhered rigidly to the Democratic organization, strenuously opposed all the distinctive and vigorous war measures of the administration and of Congress, and, deeming it impossible to conquer the South, were therefore earnest advocates of peace' (Rhodes). The name is derived from the venomous copperhead snake (see COPPERHEAD), which is said to strike at its victim without warning, and is therefore typical of a concealed foe. The term was revived during the Great War, being applied to certain classes who opposed the policies of the government.

**Coppermine River**, river in Northern Canada, rises in Lake Providence and Lake Point, Mackenzie province. After a somewhat turbulent course of 300 m. it flows into Coronation Gulf, Arctic Ocean. It was discovered in 1771 by Hearne, and was explored by Franklin.

**Copperplate Engraving.** See Engraving.

**Copper River**, or **Atna River**, river, Alaska, rises in the Wrangel Mountains, and flowing in a southerly direction for about 300 m., enters the Pacific Ocean at the Gulf of Alaska. Copper is found along the bed.

**Coppersmith**, the popular name for a species of barbets native to India and the Philippine Islands. The birds have brilliant plumage. They inhabit tree tops from which they make short, heavy flights. Their cry is metallic and noisy.

**Coppet**, small village, Switzerland, in Canton Vaud, on the west shore of the Lake of Geneva; 9 m. by rail n. of Geneva. The château here was the residence of Necker, the



famous French minister (1790-1804), and of his daughter, Madame de Staël (1804-5 and 1807), who was buried in the park; p. 531.

**Coppice.** See **Copse**.

**Coppinger, John Joseph** (1834-1909), Irish-American soldier, was born in Queens-town, Ireland. He emigrated to the United States in 1861, received a commission as captain in the Federal Army. He fought with distinction through the Civil War, and continued in the service after its close. He was promoted brigadier general in 1895, and three years later, as major general of volunteers, was in command of the Fourth Army Corps during the Spanish-American War. He was retired in October, 1898.

**Copra**, the native and commercial name for the dried kernel of the coconut, important as the source of coconut oil. It is prepared by husking and splitting the coconuts, extracting the kernel, and drying it in the sun, over slow fires, or in hot air chambers or rotary driers. Large quantities of copra are exported annually from the islands of the Southern Pacific, the oil seldom being extracted in the country of origin. See **COCOANUT**.

**Coprolites**, the fossilized excrements of animals found in Paleozoic, Mesozoic, and Tertiary strata. They are the voidings chiefly of saurians and sauroid fishes and often contain portions of scales, bone, teeth, and shells, the indigestible parts of the food on which the animals lived. They contain a large proportion of phosphate of lime, and when obtainable in sufficient quantity are of value in the preparation of artificial manures (compare **GUANNO**). See **PHOSPHATES**.

**Copse**, or **Coppice**, a growth of small trees periodically cut, usually for other than timber purposes, and reproduced by shoots springing from the stumps and roots. The coppice system of forest management is the simplest method of reproduction for trees of good sprouting capacity, as the chestnut, oak, hickory, basswood, yellow poplar, elm, red maple, white ash, and black locust. Cutting takes place at periods of from twelve to twenty-five years, depending upon climatic conditions, the purposes for which the wood is to be used, and other considerations. The coppice system is used extensively in the Eastern United States for fuel, posts, telegraph and telephone poles, charcoal, railway ties, and bark for tanning.

**Coptic Version.** See **Bible**.

**Coptis**, a genus of plants of the family Ranunculaceæ. *C. trifoliata*, called Goldthread, is a native of swamps in the colder

northern regions of both hemispheres. See **GOLDTHREAD**.

**Copts**, the Christian descendants of the ancient Egyptians, living chiefly in Upper Egypt and in the cities of Cairo and Alexandria, and now numbering about 750,000. Racially identical with the Moslem Egyptians, they are differentiated by their religious beliefs and by certain intellectual qualities. The *Coptic Church*, which is the ancient national church of Egypt, dating back probably to apostolic times, was separated from the Greek Church in 451 A.D. by its refusal to accept the decision of the Council of Chalcedon. Its tenets are those known as Monophysite (see **MONOPHYSTITES**), their followers admitting the divine nature of Christ, but insisting that His human nature, while not separate from the divine, is united with it 'without mingling and without confusion and without alteration.' The highest dignitary is the patriarch of Alexandria, who resides at Cairo. The ritual, liturgy, and vestments are especially interesting as they preserve unchanged the ancient Christian forms.

The *Coptic Language*, of which there are several dialects, is the descendant of the ancient Egyptian, though the alphabet is Greek uncial. It is not grammatically taught, and is not now a spoken language, having been everywhere supplanted by Arabic except for liturgical purposes. The literature is wholly religious. See **EGYPT**. Consult Fowler's *Christian Egypt Past and Present*.

**Copulative**, in English grammar, a term applied to a conjunction by which two coordinate clauses or members of a clause are united, as *and*, *also*, *not only . . . but also*.

**Copyhold**, a peculiar form of land holding in England derived from the villein tenure of the Middle Ages, and a lesser estate than freehold (see **TENURE**). The term signifies that the lands are held by copy of the court roll of the manor, this being evidence of the right to possess (see **MANOR**). No land is held by this species of tenure in the United States.

**Copying Machines**, appliances for producing copies of writing made by pen, pencil, or typewriter. When a number of copies is to be made simultaneously, sheets of thin white paper are interleaved with carbon paper, and a style or other sharp-pointed instrument is used to trace the writing, which is transferred in black to the white sheets. Other devices are the *hectograph*, in which the writing is at first done with aniline ink and then transferred to a gelatinous plate,

from which duplicates may be made, and the *mimeograph*, in which the copying is done by means of steels stencils (see *MIMEOGRAPH*).

Engineers and architects use a 'blue print' photographic process for copying plans and drawings. See *INKS AND STAINS*.

**Copyright**, the exclusive right of printing, publishing, or selling, copies of a literary or musical composition, or of producing or reproducing a dramatic or artistic work. While this right is usually referred to the statutes known as Copyright Acts in the United States and other countries, it is in reality founded on common law rules of great antiquity. Thus the writer of a letter or other manuscript, or the author of a drawing, speech, or play, is protected both in law and equity against the unauthorized publication of his work. Under common law, however, such rights cease upon publication, and it is at this point that copyright legislation is necessary to extend to the author the same protection for a limited term after publication that the common law had given him before.

The authority to secure 'to authors and inventors the exclusive right to their respective writings and discoveries' is one of the powers bestowed upon Congress by the Constitution. The present Copyright Law was enacted on March 4, 1909, and amended by subsequent Acts of Aug. 24, 1912, March 2, 1913, March 28, 1914, July 3, 1926, and May 23, 1928. It secures to persons complying with its provisions the exclusive right to 'print, reprint, publish, copyright, and vend the copyrighted work.' The same exclusive control is secured for translations, for the dramatization of a work of literature, for converting into literary form the material of a drama, for the arrangement or adaptation of a musical composition, and for the execution and reproduction of a work of art. A similar copyright control is given for the text of a lecture, sermon, or address; for the performance or representation of a dramatic work, and for the matter of a musical composition. In the case of a musical composition, however, the 'exclusive control' is subject to restriction.

The original term of copyright is twenty-eight years from the date of entry. Provision is made, however, for the extension of the copyright for a second term of twenty-eight years. The control of copyrighted productions secured for citizens or residents of the United States is extended to the citizen of any State which grants 'reciprocal privileges to the citizens of the United States.'

*Procedure.*—The first step in securing copyright on works intended for sale or public distribution is the publication of the work to be copyrighted, with the copyright notice in the prescribed form and place. Immediately after publication two copies (or if the work is by a foreign citizen and first published in a foreign country, one copy) of the best edition must be forwarded to the Copyright Office, Library of Congress, with an application for registration, which is made under regulations issued by the Register of Copyrights, subject to the approval of the Librarian of Congress. A notice of copyright, as prescribed by the copyright law, must be affixed to each published copy of the work protected by the copyright and offered for sale. In books this must appear either on the title page or the page immediately following. A copyright is infringed by any unauthorized publication, reproduction, or sale of the copyrighted matter. The courts have held that not only the reproduction of the exact words or phrases in the original work, but the reproduction in substance of its plot, scheme, or arrangement, constitutes an infringement. Under the present law the author whose work has been infringed is placed in a position to secure an injunction restraining any continued infringement. When the infringement has been proved, he can secure under an action at law the damages which shall be shown to have accrued; or in lieu of damages the court may in its discretion allow a specific amount, not to be less than \$250 nor to exceed \$5,000.

The present British copyright law was enacted in 1911, and extends throughout the British possessions except the self-governing dominions. It applies to every original literary, musical, and artistic work; and the rights protected by it include lectures, translations, performing rights, the conversion of dramas into novels and of novels into dramas, and mechanical reproduction by records and cinematograph films. The duration of this monopoly, in the case of work published in the lifetime of the author, is for the term of the author's life, and, with certain restrictions, fifty years beyond. No registration is required, but a copy of every book published must be deposited in the British Museum within a month after publication.

The Canadian copyright privilege is extended to any person who is, at the date of the making of the copyrighted work, a British subject, a citizen or subject of a foreign country adhering to the International Con-

vention, or resident within His Majesty's Dominions. With certain exceptions the copyright period is the life of the author and a period of fifty years after his death. The copyright fee is two dollars for registration and one dollar for a certificate of registration. By virtue of an agreement dated Dec. 27, 1923, citizens of the United States receive the privileges of the Canadian copyright law.

In 1886 a convention held in Berne, Switzerland, in which nearly all the states of Europe were represented, adopted a series of regulations providing for reciprocity among the nations in copyright relations, so that the works of the citizens of any one state should secure protection throughout the territory of all the states which accepted the convention. Through the copyright relations established between the United States and Great Britain, works originating in the United States can secure protection throughout the territory covered by the Berne regulations if they are brought into print in Great Britain not later than the date of publication elsewhere.

*Bibliography.*—Consult Copinger's *Law of Copyright* (4th ed.); Colles and Hardy's *Playright and Copyright in All Countries*; R. R. Bowker's *Copyright: Its History and Its Law* (1912); A. W. Weil's *American Copyright Law* (1917).

**Coquelin, Benoit Constant** (1841-1909), known as COQUELIN AÎNÉ, distinguished French actor, was born in Boulogne-sur-Mer. On Dec. 7, 1860, he made his début as Gros-René in *Dépit amoureux* but his first success was as Figaro in *Le mariage de Figaro*. In the modern drama, his Gringoire and his Cyrano de Bergerac stood out as brilliant performances—the first quaintly and humorously touching, the second flamboyantly picturesque. In 1886 Coquelin was elected a member of the Comédie Française. In the following year he toured on the Continent, and in 1888 he visited the United States. He appeared again in the United States in 1893-94, and in 1900-1, during which latter visit he played Flambeau, in *L'Aiglon*, to the Duc de Reichstadt of Sarah Bernhardt.

**Coquelin, Ernest Alexandre Honoré** (1848-1909), commonly known as COQUELIN CADET, French actor, younger brother of Constant Coquelin. He created important parts in *Le sphinx*, *L'ami Fritz*, *Les corbeaux*, *Denise*, and *L'héritière*.

**Coquerel, Athanase Josué** (1820-75), French Protestant divine, son of A. L. Coquerel, was born in Antwerp. He was pastor in Paris from 1850, and with his father was

one of the leaders of the liberal school of French Protestantism.

**Coquerel, Athanase Laurent Charles** (1795-1868), French Protestant divine, was born in Paris. From 1818 to 1830 he worked among the Calvinists in Holland, but returning to Paris in 1830 he founded the periodical *Le Protestant*, and later another, *Le Lien* (1841-4).

**Coques, or Cocx, Gonzales** (?1618-84), Flemish painter, was born in Antwerp. He was a pupil of Pieter Breughel and Ryckaert, and was called 'the little Van Dyck,' because his portraits, though extremely small, have the freedom and breadth of Van Dyck's work, together with great delicacy and refinement.

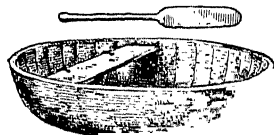
**Coquilla Nut**, the fruit of a Brazilian palm, an ally of the coconut palm. It is used in turnery owing to its beautiful mottled appearance, and is sometimes called vegetable ivory.

**Coquimbo**, seaport, Chile. It is the seat of a U. S. consular agency; p. 13,000.

**Coquina**, a rock made up almost wholly of broken fragments of shells. Such a shell limestone is accumulating off the coast of Florida, and it is to this particular type that the name is applied. In Florida and the Bermudas it is used for building.

**Coquito**, a Chilean palm, of which the sap is boiled down as syrup.

**Coracle**, or **Currach**, a light primitive boat, made of wicker or laths covered with leather or canvas. The form used by the early Britons was made of a willow frame over which skins were stretched. The coracle



*Wicker Coracle.*

now used on Welsh rivers and on the Dee for purposes of fishing is like a square basket, having a thwart across the centre, on which the fisherman sits, manœuvring the rod with one hand and the paddle with the other.

**Coracoid Process** (Greek *korax*, 'beak'), a beak-like projection from the upper part of the scapula or shoulder blade. It lies a little under the outer end of the collar bone, where it can be felt. It gives attachment to various muscles.

**Coral**, generally the calcareous skeleton of

various members of the class known as Anthozoa. A considerable number of the Cœlenterata have the power of taking up lime from sea water, and building this into a skeleton. Where these limy skeletons reach a considerable bulk, the product is commonly called Coral; but a coral reef contains, in addition to such coral, calcareous seaweeds (nullipores), calcareous tubes of worms, calcareous sponges, and so on, so that the term coral is sometimes loosely applied to the hard parts of several organisms, whose skeletons form more or less compact rock. By far the majority of reef corals belong to the Madreporaria, a division of the Anthozoa or Sea Anemones, which include forms having their tentacles in a multiple of six. To the genus *Madrepora* itself belong the Stag's-horn Corals, so often seen in museums or shops in the dry state; they are of great importance in reef-building.

A dried madreporal coral looks like a piece of porous limestone, and is dotted over with distinct holes. From each of these, in life, a small sea anemone protrudes, and the porous nature of the coral is due to the fact that these sea anemones communicate with one another by numerous canals, ramifying through the substance of the colony. The coral is indeed made up of the skeletons of a number of sea anemones, united together by a system of canals. There is a great variety of such colonial corals, often in life brilliantly colored, and often with the growing points of the colony differently colored from the older parts. Such colors as green or greenish brown, red, blue, pink, and yellow, all occur, and combine to give the reefs their beautiful tints. In addition to the branching madrepores, mention should be made of the *Meandrina* or Brain Coral and the Red Coral which has considerable commercial value. While the reef of the zoologist is the area where the living corals with the host of commensals or associated organisms are found, the reef of the geographer may be a compact mass of limestone. Indeed, whether we take the limestone peninsula of Florida or the keys which lie off it, the Bahamas or the Bermudas in the Atlantic, the Fiji Islands, or those of Low or Paumotu group in the Pacific, the same phenomenon is encountered—a thin crust of recent deposits covering a thicker mass of older limestone; and only in few cases such as the Ellice Islands, is the recent coralliferous limestone alone visible. The living reef-building coral is found in sea water as deep as from 250 to 300 ft., but

the regions where it grows best do not extend below half this depth.

Coral reefs and islands are low masses of limestone, sand, and conglomerate. They may be plastered on to an island, which may or may not be of quite different composition (fringing reefs); or they may form a low breakwater within which a lagoon, rarely of great depth, comes between the reef and the island (barrier reefs); or they may form a more or less enclosed ring or oval-shaped belt, within which is a lagoon (atoll). The depth of these lagoons varies from a few ft. to several hundred. On the outside, the coral reef or island may sink for some distance almost perpendicularly (Bougainville reef to over 300 ft., Funafuti 800 ft.), and slope very steeply thereafter, or the steep slope may begin from the surface. Slopes of 50° are not uncommon—e.g., in the reefs cited in the Macclesfield Bank, e. of Luzon, Philippine Islands, and others. While this is the case with the individual island, it is usually found that a group of coral islands rises from a well marked submarine bank. The most intensive developments of corals probably occur in the West Pacific, in the relatively shallow seas off New Guinea and Australia; but even in the Great Barrier reef of Australia the crust of recent coral is relatively thin, and older limestone constitutes the main mass. The horizontal distribution of recent reef coral is well defined. Roughly, it is found only between the tropics, and even there not in the eastern parts of the oceans. The contemporary coral reefs nearest the pole are the Bermudas, 32° N., in the Atlantic; Lord Howe Island, 31° S.; on the coast of Natal, 30° S.; and round the Sinai Peninsula, in the Red Sea, nearly 30° N. Most scientists agree that coral islands present one of the most complicated problems for the naturalist, who has not yet sufficient data to estimate the importance of nearly all the factors. Consult Dana's *Corals and Coral Islands*; Darwin's *Structure and Distribution of Coral Reefs*; Davis, *Dana's Confirmation of Darwin's Theory of Coral Reefs*, in *American Journal of Science*, 4th series, vol. xxxv. (New Haven, 1913).

**Coral Fishes**, a name applied to the members of two families of fishes, both particularly abundant in the neighborhood of coral reefs. One of these is the *Chaetodontidae*, and the other the *Pomacentridae*.

**Corallian**, a sub-division of the Jurassic system in England, comprising those rocks which rest upon the Oxfordian, and are cov-

ered in turn by the Kimmeridge clay. They are principally coral limestones and calcareous grits, and are in places so crowded with corals as to constitute veritable fossil coral reefs.

**Coralline**, a name applied to any species or plant of the genus *Corallina*, especially to *Corallina officinalis*, a red seaweed, coated with a deposit of lime.

**Coralline Crag**, a white or pale-colored, friable, calcareous clay, full of shells and fragments of sea urchins, belonging to the Pliocene of England.

**Coral Sea**, n. e. of Australia. In the Battle of the Coral Sea, May 3-8, 1942, the first naval battle fought in the air, the Japanese were defeated.

**Coral Snakes**, small, highly poisonous reptiles, belong to the Colubridæ, the family which also includes the deadly cobra. The type species is *Elaps corallinus*, found in the forests of South America. Its coloring is vivid and characteristic, consisting of black and yellow circling bands on a red ground. One small species inhabits Florida, and its bite may be extremely painful if the venom enters the blood.

**Coram, Thomas** (1668-1751), English philanthropist, was born in Lyme Regis, Dorsetshire. He founded a colony for unemployed English artisans in Nova Scotia, and was the originator of the Foundling Hospital. In 1732 he was appointed one of the trustees for Georgia, and was a promoter of the English settlement there.

**Coran.** See **Koran**.

**Cor Anglais**, a musical instrument, known more familiarly as the English horn. It is really a tenor oboe, though its tone is less piercing and more suited for the expression of melancholy than the tone of the oboe. It is often met with in Bach's scores under the name of *oboe di caccia*, but it had long been in disuse when Rossini revived it in his *Guil-laume Tell*.

**Corato**, town, Italy. On a hill close by is the former hunting château of the Emperor Frederick II., Castle del Monte; p. 45,000.

**Corban** (Heb. *gorban*), an oblation or gift (to God) specially in fulfilment of a vow.

**Corbel**, in architecture, a range of stones which supports, or seems to support, the more elevated projections of a cornice, parapet or battlement.

**Corbet, Richard** (1582-1635), English bishop and poet, the son of a Surrey gardener, was born in Surrey. He was famed for his convivial habits and his opposition to

Puritanism. His poems (the longest of which, *Iter Boreale*, is an account of a holiday tour of four Oxford friends) were collected and published in 1647-1672, and 1807.

**Corbie Step**, or **Crow Step**, a characteristic feature of the Scottish Middle Pointed or Decorated period of architecture. It consisted of a steplike trimming on the steep gables of dwellings and other secular buildings. A similar form of gable ornament is found in France, Holland, and Germany, and in some of the early Dutch houses in New York.

**Corbin, Henry Clark** (1842-1909), American soldier, was born in Clermont co., O. He served in the Army of the Cumberland during the Civil War. After the war he entered the regular service, and was stationed for ten years in the West, served in the Spanish-American War, and in 1904 was placed in command of the Division of the Philippines.

**Corchorus**, a genus of plants belonging to the order *Tiliaceæ*. The two most important species are the cultivated, tropical, annual shrubs, *C. olitorius*, popularly known as Jews' mallow, and *C. capsularis*, from the stalks of which jute is obtained. The young shoots are also used as flavoring herbs on which account the plant is largely cultivated in Syria, India, and other parts of the East.

**Corcoran, William Wilson** (1798-1888), American financier and philanthropist was born in Georgetown, D. C. His firm at one time financed nearly all the bond issues of the U. S. government. He founded the Corcoran Art Gallery at Washington and minor institutions, his donations mounting into millions of dollars.

**Cord** or **Cordage**. See **Ropes**.

**Corday d'Armans, Marie Aline Anne Charlotte** (1768-93), French revolutionist, was born in Normandy, a descendant of Pierre Corneille. Though of noble birth, she adopted with enthusiasm the principles of the Revolution; but its bloody excesses so filled her with horror that she determined to save her country from the Terrorists in power. Guillotined for the assassination of Marat, she has been celebrated in verse and prose by André Chemier, Lamartine, Michelet, and Ponsard.

**Cordelier Club**, the name of an association founded in Paris at the beginning of the Revolution, which played a prominent part in moulding public opinion in Paris. Its leaders were Camille Desmoulins, Marat, Hébert, and Danton.

**Cordials**, weak alcoholic solutions flavored with essential oil, fruit essences, or plant extracts, frequently colored with burnt sugar or caramel, and sweetened with syrups.

**Cordier**, or **Corderius**, **Mathurin** (c. 1478-1564), French scholar, was born in Normandy or in Le Perche. He was a teacher of Calvin, who dedicated to him his *Commentary on the First Epistle to the Thessalonians*.

**Cordierite**, also known as **Iolite**, **Dichroite**, a mineral consisting of aluminum and magnesium silicate. In good specimens it is clear blue in color but the color of transmitted light depends on the direction in which it passes through the crystal; polished cubes of this mineral change color as they are turned in different directions.

**Cordillera**, the most complex type of the group relations of mountains consisting of several mountain chains in the same continental region. The chains of the Rocky Mountains, Sierra Nevada, Coast Range, and their extensions make up the Western Cordillera of North America.

**Cordite**, the name given to the smokeless explosive used in the British army and navy in the cartridges of cannon and small arms. It is so-called from the cord-like form into which it is manufactured. Cordite M.D. consists of about 30 per cent. nitroglycerin, 65 per cent. guncotton (nitrocellulose), and 5 per cent. mineral jelly.

**Cordoba**, province, Argentine Republic, ranking after Buenos Ayres in population and importance. Cattle, sheep, and horses are reared, and a comparatively small area is devoted to agriculture. Mineral deposits include lime, salt, marble, gold, copper, lead and silver; p. 1,001,742.

**Cordoba**, city, Argentine Republic, capital of Cordoba province, is a progressive, though somewhat mediæval appearing city, with a university, established in 1613, the National Observatory, and Academy of Sciences, hospital, public library, a cathedral and several fine churches; p. 289,000.

**Cordova** (Sp. *Córdoba*), province, Spain, in Andalusia. The plains produce abundance of fruit, wine, olives, and grain, and the upper slopes pasture many cattle, as well as half-breed Arab horses much esteemed in Spain; p. 607,455.

**Cordova**, city, Spain, capital of the province of Cordova. It bears evidence of its Moorish ancestry and its chief glory is the great mosque, now a Christian cathedral,

still one of the most lovely buildings in the world. It was begun by the Caliph Abdur-Rahman in 770. The town is famous for its silversmiths' work and also has manufactures of paper and textiles.

Cordova is said to have been founded by the Carthaginians, and was an important place at the time of the Punic wars. Here the Romans founded a patrician colony (*Corduba*) in 152 B.C. It was the city of the Arab caliphs of the w., and the centre of luxury, learning, and civilization, when Europe was overrun by the barbarians, being at the height of its glory in the 10th century. The two Senecas, Lucan, Averroës, and other great men were born here; p. 82,243.

**Corduroy**, a thick corded cotton fabric. It has a ribbed surface and a cut pile like velvet and it is strong and enduring.

**Corduroy Road**, a road constructed of trunks of trees split into halves and laid close together, with the rounded surface uppermost, transversely to the direction of the road. Such roads are generally made over swampy or marshy ground.

**Cordwainer**, originally a worker or dealer in cordwain or cordovan (from Cordova, in Spain) leather—hence a shoemaker. The term now only survives as the name of an English trade guild, or of a trade union embracing every branch of the trade.

**Corea**. See **Korea**.

**Coregonus**, a genus of salmonoid fish, which includes a large number of lacustrine species found both in Europe and America. The American species, which are found in the Great Lakes and are a popular food-fish, are called whitefish.

**Corelli**, **Arcangelo** (1653-1713), violinist and composer whose name marks an epoch in the history of violin playing, was born at Fusignano. Corelli's distinctive powers as a composer and executant gave a new impetus to his art, and many of his numerous compositions are still included in the repertoire of modern violinists.

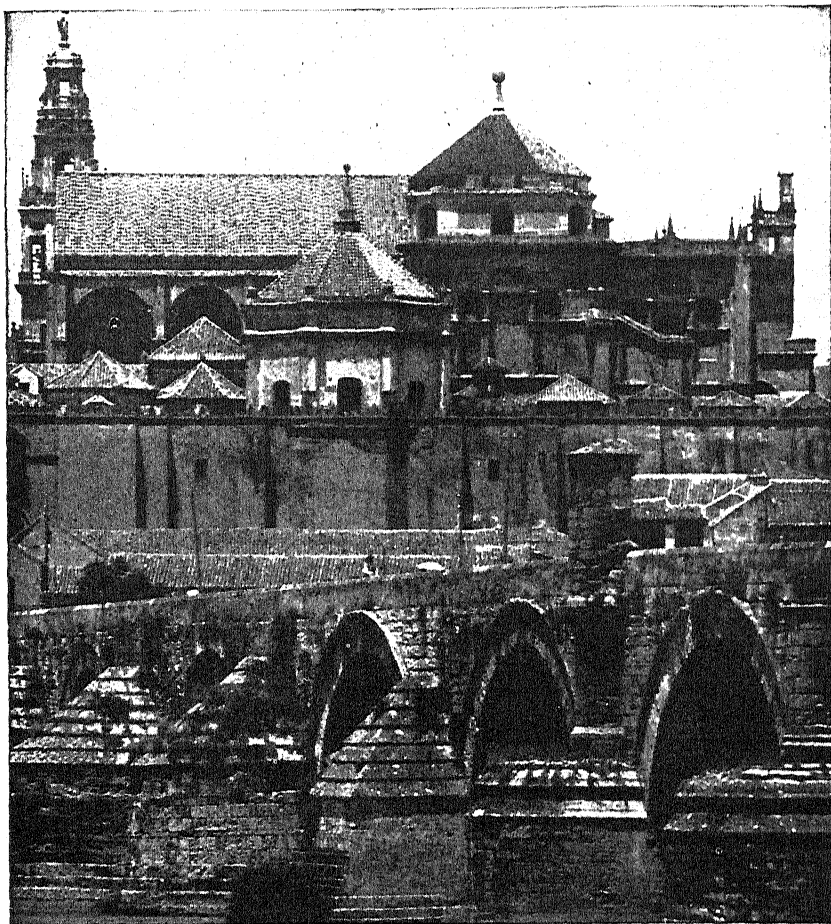
**Corelli**, **Marie** (1864-1924), English novelist, was born in Italy. She was adopted by Charles Mackay, the poet. With her first volume, *A Romance of Two Worlds* (1886), she attracted the notice of the reading world, and achieved a popular reputation which, in spite of adverse press criticism, has since 1886 been more or less fully maintained. In 1900 she produced *Boy* and *The Master Christian*; and in 1902 the novel *Temporal Power*. Her other works include *Vendetta*

(1886), *Thelma* (1887), *Ardath* (1889), *The Soul of Lilith* (1892), *Barabbas* (1893), *The Sorrows of Satan* (1895).

**Corentyne, Corentyn, or Corentijn**, river, South America, forming the boundary between British and Dutch Guiana.

**Coreopsis**, or **Tickseed**, a genus of showy American composite plants, many of which are popular members of the garden

island, Scheria, mentioned in Homer's *Odyssey*. It was colonized by Corinth about 700 B.C. The most ancient naval battle on record was fought between Corinth and Corfu about 650 B.C. In 433 B.C. its alliance with Athens led to the Peloponnesian War. In 1815-1863 it was under the protection of Great Britain, since when it has formed part of the kingdom of Greece; p. 138,470.



*The Cathedral, Cordova, Spain.*

flora. They are all easy to cultivate, and the annuals are readily raised from seed, some either out of doors in April and May or in heat in March. Its flowers are yellow or rose-purple in color.

**Corfu**, formerly known as **Corcyra**, an island in the Ionian Sea, area, 278 sq. m. The Greeks identified Corfu with the Phaea-

**Coriander**, the dried ripe fruit of an umbelliferous annual plant, which is a native of Europe. It is the gad of the Hebrews and the corion of the Greeks. In Europe it is quite extensively used as a flavoring in confectionery, and in the preparation of liquers; and also as an aromatic carminative in pharmacy.

**Corinth**, city, Mississippi, county seat of Alcorn County, on the Southern and the Mobile and Ohio Railroads. Because of its location it became a point of strategic importance during the Civil War; p. 7,818.

**Corinth**, ancient city, Greece, situated on the southern coast of the Gulf of Corinth, s.w. of the isthmus of Corinth. The ancient and mediæval importance of Corinth depended on its position on the isthmus and

against Athens, which was, after the fall of Ægina, their chief commercial rival. The modern town and railway junction lie on the w. shore of the isthmus, about 3 m. s. of the entrance to the canal, and about 4 m. n. from Acrocorinthos; p. 5,000.

**Corinth**, or **Lepanto**, **Gulf of**, an arm of the Mediterranean extending through Greece, separating the mainland on the n. from the Peloponnesus on the s., and communicating on the w. side by the Strait of Lepanto with the Gulf of Patras.

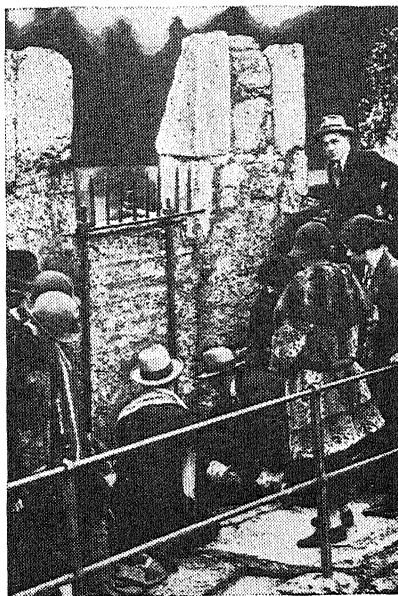
**Corinth**, **Isthmus of**, a neck of land connecting the mainland of Greece with the Peloponnesus. Ruins of great antiquity are found on it, the most celebrated being the Isthmian Wall and the temple of Poseidon or Neptune.

**Corinthian Architecture.** See **Architecture**.



*Coreopsis*

on the natural fortress, Acrocorinthos, a spur of the hills of the Peloponnesus about 6 m. s. of the narrowest point. The earliest settlement was on the Acrocorinthos. About 1000 B.C. it was occupied, like the rest of the Peloponnesus, by the invading Dorians. Under their rulers Corinth attained the height of its prosperity. After the expulsion of the despots, the Corinthians were for two and a half centuries closely allied with Sparta, and sided with them in the Peloponnesian War



*Near Cork, Ireland.*

Kissing the Blarney Stone.

**Corinthians, First Epistle to the**, one of Paul's four 'great epistles,' believed to have been sent from Ephesus by the hands of Timothy about the year 57 A.D. The apostle had visited Corinth in the course of his first European journey, but after his departure certain Judaizing teachers had split up the young community into factions, and this, together with the scandals that seem to have



sprung up about the same time, gave him an opportunity of pastoral intervention. Thus, we find him dealing with partisanship and insubordination; next, a glaring case of immorality; meats offered to idols, and public worship generally; spiritual gifts and their regulation; the resurrection; he closes with a few personal details and the usual salutation. Its genuineness is well attested, both externally and internally, and is admitted by all responsible critics.

SECOND EPISTLE TO THE CORINTHIANS, likewise one of the 'great epistles' of Paul, written in Macedonia (c. 57 A.D.), and conveyed thence to Corinth by Titus. Its contents are much more personal than those of the First Epistle, consisting largely of the Apostle's self-vindication against attacks, and his defence of his apostolic standing; but it has a notable section on Christian liberality, the occasion for which was the collection for the poor members of the congregation at Jerusalem. Of numerous Commentaries may be mentioned those of Schmiedel, Shaw, Scott, Beet, Lias, Ellicott, Godet, Dods, Findlay, Bernard, Rendall, and Robertson and Plummer.

**Corinth Ship Canal**, across the Isthmus of Corinth, Greece. It was constructed in 1893, is 4 m. long, 26¼ ft. deep, and 72 ft. wide. See also CANAL, NAVIGATION.

**Coriolanus, Gaius, or Gnaeus Marcius**, is the hero of an early Roman legend. He distinguished himself at the capture of Corioli and so won his surname. He was strongly opposed to the plebeians, who refused to elect him for the consulship. After this, during a time of famine, he argued in the senate against a gratuitous distribution of the corn which had arrived from Sicily, unless the plebeians should give up their tribunes, for which he was impeached and banished (491 B.C.). Shakespeare's *Coriolanus* is a stately and impressive drama.

**Cork** (Spanish *corcho*, from Latin *cortex*) is the highly developed corky layer (see BARK) of the bark of the cork tree or cork oak of the Mediterranean. The tree is not of great size, generally 20 to 60 ft. high, the trunk often 3 ft. in diameter, much branched, with ovate-oblong evergreen leaves, entire or serrate. The acorns are edible, resembling chestnuts in taste, and furnish excellent food for swine. The tree is usually 20 or 25 years old before it yields a gathering of cork, and attains an age of 150 years. The first produced is of little value; but it is removed in order that the next pro-

duction may be better. Of all the uses to which corkwood is put, the manufacture of corks for stopping bottles, casks, etc., remains pre-eminent. Among other articles in the manufacture of which cork is increasingly used are insoles, life preservers, cigarette tips, instrument handles, polishing wheels, carburetor floats for automobiles, and insulating for pipes.

**Cork**, maritime co. in the s.w. of Munster, Ireland, lying between Waterford and Kerry. The coast is bold and rocky, and 250 m. long. About one-fourth of the county is under cultivation. Oats, barley, potatoes, and turnips are the principal green crops. The county contains numerous raths, besides cromlechs, barrows, caves and stone circles. Area, 2,890 sq. m.; p. 328,489.

**Cork**, city and seaport, capital of County Cork, and a county in itself. The central part occupies an island between two arms of the Lee. The Protestant Cathedral, a handsome structure in the early French Gothic style, was completed in 1879. Three other churches call for special mention—the Roman Catholic Cathedral of St. Mary (1808); the Church of St. Anne Shandon, rendered famous by the lyric on its bells written by 'Father Prout', who was buried in the churchyard; and the Father Mathew Memorial Church, in memory of the apostle of temperance in Ireland. Here also are University College (founded as Queen's College in 1849, and rechartered in 1908). Cork is the third commercial town of Ireland. The principal industries are tanning, distilling, brewing, iron founding, and the manufacture of woollen goods (tweeds and friezes) and chemical manures. The city probably grew up around the monastery founded by St. Finbar in the 7th century. The Danes, after plundering the town in the 9th century, established themselves on the island in the Lee, where another town grew up; p. 80,700.

**Cork, John Boyle**, Fifth Earl of, and fifth Earl of Orrery (1707-62); remembered as the author of *Remarks on the Life and Writings of Jonathan Swift* (1751). He was also the friend and patron of Pope and Johnson.

**Cork, Richard Boyle**, First Earl of (1566-1643), British statesman, known as the 'great earl,' was born in Canterbury. He was knighted in 1603, and made Earl of Cork in 1620. In 1631 he was appointed Lord High Treasurer of Ireland. When the rebellion broke out in Ireland (1641), Boyle raised an army at his own expense, and by

skilful tactics succeeded in crushing it.

**Corliss, George Henry** (1817-88), American inventor, was born in Easton, N. Y. He built the enormous engine at the Centennial Exhibition of 1876 at Philadelphia, which drove all the machinery of the fair.

**Corm.** See **Bulb**.

**Cormac**, (836-908), king of Cashel, Ireland, was the son of Cuilennan, an Irish chief. He is the reputed author of *Sanas Chormiac*, the earliest Irish dictionary extant.

**Cormenin, Louis Marie de La Haye, Vicomte de** (1788-1868), French public official, was born in Paris. He received an appointment on the staff of the State Council (1810), and eventually became an authority on administrative law. On the accession of Louis Philippe he made himself popular and famous by hurling a crowd of pamphlets against the new sovereign. The most important are: *Lettres sur la Liste civile* (1831); *Très Humbles Remonstrances de Timon* (his pseudonym, 1838); *Livre des Orateurs* (1836).

**Cormorant**, the name given to certain large water birds belonging to the order Ciconiformes, and the sub-order Steganopodes. They are familiar birds, frequenting islands in most parts of the world. They vary greatly in size. They feed exclusively on fish, and are proverbial for their voracity. They do not dive when in flight, but from the surface of the water. Fishing with cormorants has been practised in China and Japan from time immemorial.

**Corn, or Clavus**, a thickening of the skin due to friction and intermittent pressure. It may occur anywhere, but is commonest on the toes. The corn may end in inflammation and suppuration; in that case it must be opened, and treated like any other abscess. If attended to sufficiently early, all that is necessary is to change the shoes so as to shift the pressure points.

**Corn, Indian Corn, or Maize** (*Zea Mays*), specifically, a native grain of the plateau region of tropical America, which has become known throughout the world since the discovery of the Western Continent. The American colonists found it cultivated by the Indians, and called it *Indian Corn* to distinguish it from the corn of Europe, where the term is also used for wheat, rye, or barley. The natives of the West Indies called it *mahiz*, from which is derived the word *maize*, by which the grain is commonly known throughout the Old World.

Columbus is believed to have introduced it into Spain on his return from America; and from Spain it was gradually carried to the other countries of Europe, and to Asia and Africa. Corn is an annual, and with other common cereals belongs botanically to the order Gramineæ, or the Grasses. In structure it is distinguished from the other common grain crops by its larger growth, by the location of its male and female flowers, and by its pithy or solid stems, stocks, or stalks. In height the plant varies from 2 to 15 ft. or more, according to the type and variety.

The corn kernel is made up principally of starch, the white and mealy portions consisting mainly of this substance; while the hard and flinty parts contain most of the protein, and the germ most of the oil. There are six types of corn generally cultivated for grain—namely, Pod, Pop, Flint, Dent, Soft or Flour, and Sweet or Sugar corn. The following are well known varieties of the above types: Dwarf Golden and Rice popcorn, King Philip and Longfellow flint corn, Reid Yellow, Leaming, and Boone County White dent corn, Cuzco soft corn, and Early Boston Market and Stowell Evergreen sweet corn. In the growing of corn, the land is ploughed about 8 inches deep and harrowed to make a uniform seed bed. The crop is planted in hills or check rows, and in drills. The planting is done when the soil is sufficiently warm and moist, usually in May. Different varieties of corn require from a month or six weeks to seven months to reach their full development. The corn plant is principally used as a food and feeding stuff (see **FEEDING STUFFS**), in the raising of hogs, cattle, and sheep for market—one of the most important industries dependent on the cornfields. Corn is extensively employed in the making of cereal breakfast foods, which are consumed in large and increasing quantities in the United States and elsewhere. It holds high rank as a food for man, is assimilable, palatable, and wholesome. It is also used in the manufacture of starch, glucose, whiskey, paper, varnish guncotton, and other articles. The corn cob is utilized as fuel and in the making of tobacco pipes.

The most common diseases are smut, rust, and ear rot. The most troublesome insects include the chinch-bug, wireworm, cutworm, root worm, bollworm, corn maggot, and cornstalk borer. These as well as the common weeds of the cornfield—foxtail, smartweed, corn cockle, and the bindweeds—are most successfully combated by careful culti

vation and a proper rotation of crops. The annual corn crop of the world ranges from 4 to 5 billion bushels, one half of which is grown in the United States, where it exceeds in value that of wheat and cotton combined. The Argentine Republic holds second place, the yield in 1940 approximating 400,000,000 bushels; Roumania third with 185,000,000 bushels. See CORN CLUBS. Consult the *Bulletins* of the U. S. Department of Agriculture and of the State Experiment Stations, especially Illinois and Iowa; T. F. Hunt's *Cereals in America*, H. Myrick and Others' *The Book of Corn*; Hutchison and Wolfe's *Production of Field Crops* (1924).

**Cornaro, Caterina** (1454-1510), wife of the king of Cyprus, was born in Venice. Her portrait has been painted by many famous artists, among them Paul Veronese and Titian.

**Cornaro, Luigi** (1467-1566), Venetian dietitian, was born in Padua. At the age of forty, his health having been ruined by excesses, he began a strict regimen, in which he confined himself to 12 ounces of solid food and 14 ounces of wine a day. His health rapidly improved, and he kept up his regimen until he died, almost a centenarian. He wrote a treatise, *Discorsi della vita sobria*, in praise of a temperate life, which has been translated into many languages.

**Cornbrash**, a thin series of rough, rubbly, impure fossiliferous limestones which readily break up and yield a coarse but fertile soil, adapted to the growth of corn. The geologist William Smith applied this name to a group of limestones in the Lower Oolite rocks of England.

**Corn Clubs**, associations for the promotion of improving methods of corn cultivation. The first corn club in the United States was established in the Middle West about the year 1900. The national organization was formed in 1907, in Mississippi, under the direction of W. H. Smith. The corn club idea has spread over the United States, and the scope of the work has broadened to include garden, cotton, potato, poultry, canning, bread, sewing and cooking clubs. Wholesome recreational activities also form a part of the programme.

**Corn Cockle**, or **Cockle**, a common and troublesome weed belonging to the order Caryophyllaceæ. It may be distinguished by its tough, leaf-like sepals; its large, undivided petals, shorter than the sepals; its hairy stem, and its capsule opening into five teeth. Its tall, graceful habit and large lilac-purple

flowers make it one of the most beautiful of corn weeds. Its seeds are poisonous, especially to fowls and domestic animals.

**Corncrake**, or **Land Rail** (*Crex pratensis*), a European rail, especially familiar in Great Britain. The bird is about ten inches in length, and varies from brownish yellow to brown and buff in color. The harsh cry or call note of the male is generally heard incessantly at night.

**Cornea**, a tough, transparent portion of the anterior segment of the eyeball (see EYE). The most common disease of the cornea is inflammation, known as *keratitis*.

**Corneille, Pierre** (1606-84), French dramatic poet, was born in Rouen. His first tragedy, *Médée* (1635), according to Voltaire, contains the germ of the beauties of his mature dramas. The first of these was *Le Cid*, acted in the winter of 1636-7. Its success was complete, and indirectly had great importance in the future development of the French drama. The *Cid* was followed in 1639 by *Horace*, a play founded on the story of the Horatii and Curiatii as told by Livy, and containing, in the *tirade* spoken before her death by Camilla, the most magnificent burst of invective in the French classical drama. *Cinna* appeared in 1639; *Polyeucte*, one of Corneille's noblest tragedies, in 1640; and *La mort de Pompée*, a tragedy founded on Lucan, in 1641. *Le menteur*, which was produced in 1642, entitles Corneille to be called the father of French comedy as well as of French tragedy. In 1671 he joined Molière and Quinault in writing the opera of *Psyché*, and the loveliest verses which he ever penned are to be found in the scene between Psyche and Cupid. Corneille excels in the grandeur of his morality, in the eloquence and passion of certain scenes and speeches, in the splendid flashes of poetry with which he illumines the pale world of classic tragedy, and in the power and music of his verse.

The best editions of Corneille's works are by Marty-Laveaux and Lefèvre. *Le Cid*, *Horace*, and *Polyeucte* have been translated into English blank verse by Nokes, and the same three, with *Cinna*, into English prose by Mongan and McRae. For a bibliography consult Picot's *Bibliographie Corneilienne*. Consult also Guizot's *Corneille et son temps* (Eng. trans.); Sainte-Beuve's *Portraits littéraires*.

**Corneille, Thomas** (1625-1709), French dramatist, younger brother of Pierre Corneille, was born in Rouen. He wrote alto-

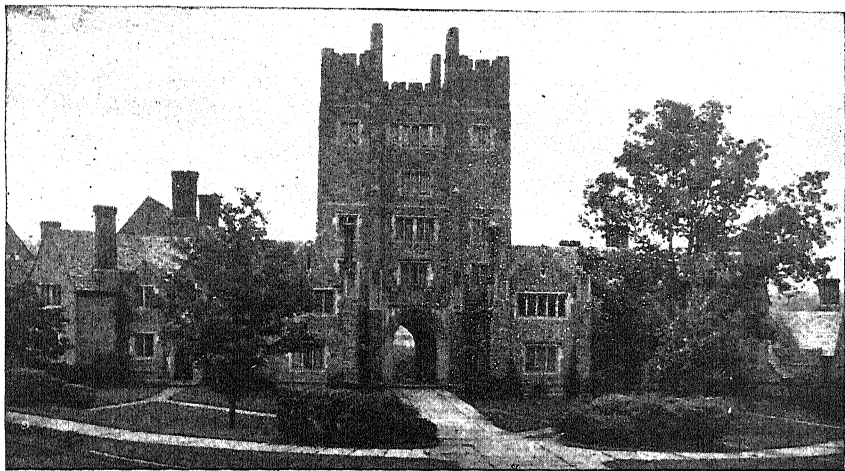
gether about forty dramas. He is at his best in his tragedies, the chief of which are *Timocrate* (1656), *Bérénice* (1657), *Stillicon* (1660), *Camma* (1661), *Maximien* (1662), *Laodice* (1668), *La mort d' Anibal* (1669), *Ariane* (1672), and *Le comte d'Essex* (1678).

**Cornel**, or **Cornelian Cherry** (*Cornus mas*), the *Cornus* of the ancients, a shrub of the order Cornaceæ, is a native of the middle and south of Europe, and of a great part of Asia. It has oval leaves, and small yellow heads of flowers, which appear before the leaves in spring. The fruit is oblong, shining, red, or rarely yellow or white. It is made into a preserve, or gathered unripe and pickled like olives.

baptism is usually regarded as the first step in the admission of the Gentiles into the Church.

**Cornelius, Peter** (1824-74), German musical composer, nephew of Peter von Cornelius, was born in Mainz. Going to Weimar (1853), he formed friendships with Liszt and others, the founders of the New-German school, under whose influence he became an ardent disciple of Wagner. He composed three operas—*The Barber of Bagdad* (1859), *The Cid* (1865), and *Gunlöd*, an unfinished work; and he is well known as a composer of songs.

**Cornelius, Peter von** (1783-1867), German painter, was born in Düsseldorf. Cor-



*Cornell University, Baker Tower.*

**Cornelia**, the mother of the Roman tribunes Tiberius and Gaius Gracchus. She was the daughter of the elder Scipio Africanus and on the death of her husband devoted her life to the care and education of her children. The Roman people erected a statue to her with the inscription: *To Cornelia, the Mother of Gracchi*. There are two famous sculptures of her, one by Cavalier, the other by Clesinger, both exhibited at the Paris Salon in 1861.

**Cornelia Gens**, one of the oldest and most distinguished clans of ancient Rome. To one of its branches belonged Tacitus the historian, Celsus the physician, Cornelius Nepos the biographer, and others.

**Cornelian**. See **Carnelian**.

**Cornelius**, a centurion in the Italian cohort stationed at Cæsarea, whose Christian

nelius drew his subjects from the Bible, mythology, Goethe, Dante, and the German minnesingers, his *Last Judgment* (in the Ludwig church) being perhaps the most colossal fresco ever executed. His influence, potent in his lifetime, has declined, except for the fact that he was the founder of the Munich school. Consult his *Life*, in German, by Förster, by Riegel, and by Von Wolzogen.

**Cornelius Nepos**. See **Nepos**.

**Cornell, Alonzo Barton** (1832-1904), American political leader. He became prominent in the affairs of the Western Union Telegraph Company, of which he was director (1868-99) and acting president (1875). He was surveyor of customs at the port of New York (1869-72); member of the State assembly, and governor of New York State (1880-2).

**Cornell, Ezra** (1807-74), American capitalist and philanthropist, was born in Westchester County, N. Y. After a brief schooling he became successively a teacher, a potter, a carpenter, and a mechanic. In 1826 he removed to Ithaca, where he had charge of a flour mill. For some time he was engaged with his brother in the lumbering business and they also carried on farming. In 1842 he became interested in the project to construct a telegraph line from Baltimore to Washington; invented devices for improved methods of wiring and some years later became one of the founders of the Western Union Telegraph Company, and amassed a large fortune. He participated in the first Republican National Convention in 1856. He was a member of the State assembly (1862-3) and senate (1864-7). In 1862, when the Morrill Land Grant Act assigned 990,000 acres of land to New York, Cornell persuaded the legislature to devote the proceeds to the endowment of a great educational institution at Ithaca; and he endowed the new institution with \$500,000 (see CORNELL UNIVERSITY).

**Cornell, Katharine** (1898- ), actress, was born in Berlin, Germany, of American parentage. She made her debut in New York City with the Washington Square Players, in 1917. In 1920 she appeared in London in *Little Women*, and since then has played the leading part in many New York productions, including *Bill of Divorcement*; *Candida*; *The Green Hat*; *The Barretts of Wimpole Street* (1931); *Alien Corn* (1933). She was married to Guthrie McClintic of New York City in 1921. In 1934 and 1935 she achieved great success with her role as Juliet in *Romeo and Juliet*, and in 1936 she acted the title role in Bernard Shaw's *Saint Joan*. Her most famous role is that of Elizabeth Barrett in *The Barretts of Wimpole Street*.

**Cornell College**, a co-educational institution of learning in Mount Vernon, Ia., founded in 1853 as the Iowa Conference Seminary, and rechartered under the present title in 1857.

**Cornell University**, a privately endowed, non-sectarian, coeducational institution at Ithaca, New York. It was founded in 1865 by Ezra Cornell upon the Morrill Act of 1862 by which the Federal government apportioned public lands to the several States for the endowment in each State of at least one college where the leading object should be 'to teach such branches of learning as are related to agriculture and the mechanic arts.'

The State of New York incorporated Cornell University and devoted its portion of the land-grant, 989,920 acres, to the university's endowment.

The university comprises the graduate school; the college of arts and sciences; the law school (graduate); the medical college (graduate), founded in 1898 by Oliver H. Payne and situated in New York City, but maintaining a division in Ithaca; the college of engineering, comprising the school of civil engineering, the Sibley school of mechanical engineering and the school of electrical engineering; the college of architecture, which offers courses leading to degrees in architecture, landscape architecture, and fine arts; and a group of four State institutions, the college of agriculture, the agricultural experiment station at Geneva, the veterinary college, and the college of home economics, which, although maintained by the State, are administered as units of the University.

There are 359 acres in the campus and 1,170 acres in experimental farms; the university owns also the Arnot Forest, 1,800 acres of woodland 15 m. from Ithaca, used for research and instruction in forestry. Ezra Cornell's greatest benefaction was the product of his purchase and management of the bulk of New York's share of the federal land-grant. He bought scrip representing 913,920 acres at the market price of 60 cents an acre under an agreement with the State binding him to sell and devote all the profits of the sale to the university. He located western lands from the sale of which the university's endowment was eventually increased by about \$5,000,000.

Andrew D. White, the first president, who had been Cornell's chief adviser and ally during a long legislative debate over the disposition of the land-grant, was the author of the university's educational scheme; he based it upon principles which seemed revolutionary to many educators at that time but which have become typical of American universities today. It called for thorough education in special departments—agriculture, the mechanic arts, civil engineering, commerce and trade, mining, medicine and surgery, law, education, and history and political and social science—and for freedom of choice of studies, even among modern languages and the sciences in the pursuit of a general education.

From Colonel Payne, its founder, the medical college received an endowment of \$5,000,000 and a building at First Avenue and

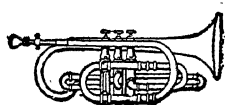
Twenty-seventh and Twenty-eighth streets, opposite Bellevue Hospital, in New York City; by arrangement with New York Hospital and Bellevue Hospital, their wards were opened to the students of the college for instruction and research. In 1927 the college was permanently affiliated with New York Hospital. Sage Chapel was built by Henry W. Sage in 1874 and was endowed by his son Dean Sage. Fifty-five acres of the campus are devoted to playgrounds. The presidents of the university have been Andrew Dickson White, 1866-1885; Charles Kendall Adams, 1885-1892; Jacob Gould Schurman, 1892-1920; Livingston Farrand, 1921-1937, and Edmund E. Day since 1937.

**Corner**, a term used in the commercial world to designate a monopoly of the supply of marketable goods or stocks, usually for future delivery, with the purpose of increasing prices unduly and benefiting the buyers. Products such as cotton and wheat may be contracted for in advance and if the supply or crop fail of realization, or if many traders follow the same course, a 'corner' is created, and is effective when sellers are forced to buy from the pool at its own prices because of a shortage of supply. Corners are 'broken' when those who have agreed to deliver the products or stocks are able to obtain them elsewhere, or when the supply is plentiful.

Where there is a definite issue of stocks or certificates, the prices may be raised to such a point that the sellers refuse to fulfil their contracts, and there ceases to be a demand—therefore no market. The practice of marginal dealing—that is, the buyer or seller depositing with a broker a certain percentage of the face value of the deal—carries with it the possibility of a corner. To 'squeeze the shorts' is another phase of a corner in which rival combinations operate in the same stocks, and the sellers are forced to pay high prices for the stock to be resold to their buyers. Probably the most famous instance of a corner in the financial history of the United States culminated on Friday, Sept. 24, 1869, known as 'Black Friday,' in the crisis of the conspiracy of Jay Gould and James Fisk, Jr., to corner the gold supply. The Secretary of the Treasury came to the rescue of the sellers of gold by releasing a supply from the U. S. treasury. Other famous corners were the wheat corner of Joseph Leiter in 1897-8, and the corner in cotton manipulated by James A. Patten of Chicago in 1909. In the latter case the U. S. Su-

preme Court handed down an important decision on Jan. 6, 1913. It declared that a corner in any commodity that enters into general use, or is transported in interstate commerce, amounts to a restraint of trade, and is a criminal offence under the Sherman Anti-Trust Law. See TRUSTS.

**Cornet**, a treble wind instrument made of brass, of comparatively recent origin, and formerly called a *cornopean*. It is played with a cupped mouthpiece, and possesses a quality of tone which comes between those of the trumpet and the bugle, the size of its tube being intermediate to those used for these instruments. The cornet has for oper-



*Cornet*

notes the harmonic sounds C (below the treble stave), and in ascending order, G, C, E, G, B-flat, C. The intermediate intervals are produced by means of three slides which lengthen the tube, to give sounds from a semitone to three tones lower, the slides being used either singly or in combination. Three pistons—depressed at will by the fingers of the performer—control the mechanism which admits air to the slides, the first of which lowers the pitch a tone; the second, a semitone; and the third, three semitones.

**Cornet**, the lowest rank of commissioned officers in the British cavalry until 1871, when the term was replaced by that of sub-lieutenant.

**Corneto Tarquinia**, town and episcopal see, Italy, in the province of Rome, 63 m. by rail n.w. of Rome. It is famous for the Etruscan antiquities discovered at the adjacent *Tarquiniæ*, one of the chief cities of the ancient Etruscans.

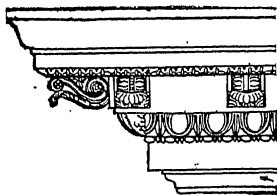
**Cornflower**, or **Bluebottle** (*Centaurea cyanus*), a well known weed in cornfields, belongs to the genus *compositæ*. In the United States it is known by many other names, of which the commonest is Bachelor's Button. It has slender, branched stems, from 1 to 2½ ft. high, and deep blue flowers.

**Cornhill**, a thoroughfare of London, England. See LONDON.

**Cornhill Magazine**, a London periodical founded in 1860, whose first editor was William M. Thackeray. In its earlier numbers.

which reached a sale of 120,000 copies, appeared George Eliot's *Romola*, in company with Thackeray's *Roundabout Papers*, and a serial by Anthony Trollope. The list of contributors includes the names of many famous writers.

**Cornice**, in architecture, the series of mouldings crowning the upper subdivision of any structure, of any order, or of any secondary member of an order. In Greek Doric the crowning portion is a single convex moulding. The supporting part also is small,



*Corinthian Cornice*

being composed of narrow slabs called *mutules*, the origin of which is supposed to have been found in the primitive timber roof. These support the middle or projecting part, which, like all cornices, presents a plain face, upright, of considerable height, called the *corona*. The Ionic and Corinthian orders resemble each other in many features. In the cornice of both there are more members than in the Doric, and the decorations are richer. In Early Gothic the small arches become ornamental—taking the form of trefoils with moulded edges. The term cornice is also applied to the plaster mouldings around the ceiling of rooms at its junction with the walls.

**Corniferous Period**, in geology, the name given in North America to the middle division of Devonian time. It is now generally known as Onondaga (mainly limestone).

**Corning**, city, New York, county seat of Steuben co. Manufactures include lumber, brick, terra cotta, and glass, railway supplies, and pneumatic drills and air compressors; p. 16,140.

**Corning, Erastus** (1794-1872), American capitalist, was born in Norwich, Conn. From a clerk in a hardware store he became a great railroad magnate, an owner of extensive iron works, and a man of wide influence in the banking world. He was instrumental in forming the New York Central Railroad system, of which he was president (1853-65).

**Corning, James Leonard** (1855-1923), American neurologist, was born in Stam-

ford, Conn., and was educated at Heidelberg and Würzburg (M.D. 1878). His discoveries include the application of spinal anæsthesia, and the prolonged effect of stimulants and sedatives upon patients resting in compressed air; and he introduced the practice of injecting liquid paraffin into the tissues. His published works include *Brain Rest* (1883); *Brain Exhaustion* (1884); *Hysteria and Epilepsy* (1888); *Pain In Its Neuro-Pathological and Neuro-Therapeutic Relations* (1894); *Musical Memory and Its Derangements* (1912).

**Corn Laws**, an important series of enactments in Great Britain, by which the importation, and in some cases the exportation, of grain were sought to be regulated. The first English law dealing with the importation of corn, in the way of restriction, was passed in 1463. Various enactments were passed in the reigns of Henry VIII., Elizabeth, and the early Stuarts; but the real beginning of the modern system of corn laws dates from the sliding scale imposed in the reign of Charles II. (1670), by which a duty of 16s. a quarter was imposed when prices were below 53s. 4d., and 8s. when prices were between 53s. 4d. and 80s. This act, which was intended to prohibit the importation of food, remained the ordinary corn law till 1773; but in the latter half of the 18th century prices were seldom low enough to permit the bounty being paid. This bounty had, on the whole, a favorable influence on corn growing, but it tended to hinder the development of other kinds of agriculture. Owing to popular discontent the duties levied under the Act of 1670 were modified and reduced in 1773, the duties being merely nominal when the price exceeded 48s.; and although an act was passed in 1791 consolidating the corn laws, the system remained till the end of Napoleon's Continental system in 1813 when large quantities of foreign corn were imported, and prices fell. The Act of 1815 consequently prohibited importation when prices were below 80s. a quarter. A strong opposition to the system had gradually been growing up but it is doubtful whether the efforts of the Anti-Corn-Law League (Manchester, 1839), although assisted by the eloquence of Bright and the energy of Cobden, would have been so completely successful, had they not been assisted by the calamity of the Irish famine. Peel, who had been undergoing a gradual process of conversion, found it necessary to throw open the ports, and from this there was no receding. In 1846

the corn laws were repealed. The repeal had no immediate effect on agriculture; but with improvements in the means of transportation, foreign competition began to make itself felt, and American competition in particular provoked a reaction in Europe against Free Trade ideas. See **TARIFF**.

**Corn Snake**, a harmless serpent (*Coluber guttatus*) of the Southern states, which is of moderate size, and is allied to the black snake, but is brownish red with lighter red blotches bordered with black.

**Cornu, Marie Alfred** (1841-1902), French physicist, became professor of physics at the Polytechnic School of Paris in 1867. His researches have been chiefly in optics. In physics he, with Baille, recalculated the mean density of the earth on the lines of Cavendish's experiments.

**Cornucopia**, a metaphor denoting plenty. In ancient architecture and in sculpture it is represented as a figure bearing an overflowing horn of corn and grain.

**Cornwall.** (1.) Maritime co. and royal duchy, forming the extreme s.w. corner of England. The Scilly Isles, lying  $34\frac{1}{2}$  m. w.s. w. of Land's End, are included in the county. A great part of the interior consists of high moorland, broken by numerous rugged 'tors' or weatherworn granite hills. The coasts are usually bounded by high, steep cliffs of slate or granite, the latter chiefly between St. Ives and Land's End. The coast scenery in the w. and part of the s. is grand and wild, and picturesque in the valley of the Tamar. The valleys are generally fertile and well cultivated. Dairy-farming receives special attention. Tin and copper are still the principal metals, and kaolin or china-clay and chinastone are extensively worked. Large quantities of granite and igneous rocks, sandstone, and slate are quarried. Fisheries constitute the third great industry of the country. The pilchard fishery is by far the most important; immense shoals appear off the coasts at certain times. Long before the dawn of British history, Cornwall probably carried on trade with the Phœnicians. After the departure of the Romans it was ruled by British princes, the most notable of whom was the legendary Arthur. About 926 it was conquered by the Saxons under Athelstan, and henceforward was partly subject to Wessex. By Edward III. it was erected into a duchy for the Black Prince about 1333. Since that time it has been an appanage of the princes of Wales. Cornwall abounds in barrows, tumuli, cromlechs, stone circles, earthworks, cliff and

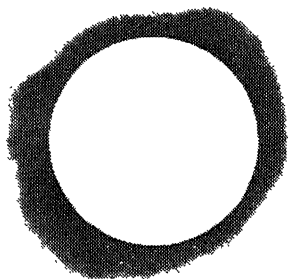
other castles, and many other interesting relics of its former inhabitants. Area 1,356 sq. m.; p. 328.131.

(2.) A port of entry, Ont., Canada, county seat of Stormont co., on the St. Lawrence River, and on five water lines. Woolen goods are the principal articles of manufacture; p. 6,598.

(3.) Vil., and summer resort, Orange co., N. Y., at the base of Storm King (1,389 ft.). It was settled in 1684 and incorporated in 1885; p. 2,658.

**Cornwallis, Caroline Frances** (1786-1858), English authoress, born at Wittersham, Kent; lived much in Italy. Her first book, *Philosophical Theories and Philosophical Experience*, by a Pariah (1842), was published in a series of 'Small Books on Great Subjects,' planned and mostly written by herself. She was a strong advocate of higher education for women.

**Cornwallis, Charles**, First Marquis (1738-1805), English general, son of the first Earl of Cornwallis; born in London. Though disapproving of the American policy of the government he served with distinction in the Revolutionary War. He was sent to America early in 1776 and took a conspicuous part under Howe in the New York campaign, including the battle of Long Island. He fought at the Brandywine (1777), and in April, 1778, became second in command, with the rank of lieutenant-general, to Sir Henry Clinton, who had succeeded Howe as commanding officer of the British forces engaged in



*Corona, during Total Eclipse of Sun.*

the war. He subsequently served in the South, and defeated Gen. Gates at Camden (Aug. 16, 1780) and Gen. Greene at Guilford Court House (Mar. 15, 1781), but finally was hemmed in at Yorktown, and on Oct. 19.



1781, was forced to surrender to Gen. Washington, his surrender virtually closing the war, though the treaty of peace was not signed until 1783. (See CAMDEN; GUILFORD COURT HOUSE, and YORKTOWN.) In 1786 Cornwallis was appointed governor-general of India. Resigning his Indian appointments (1793), he returned to England. Appointed viceroy of Ireland (1798), he successfully quelled the rebellion, and brought about the union. As he understood Catholic emancipation would follow the union, he resigned when George III. refused to sanction the measure. His next work was negotiating the peace of Amiens (1802). Again appointed governor-general of India (1805), Cornwallis died at Ghazipur. See the *Cornwallis Correspondence*, edited by Charles Ross (3 vols., 1859); and the *Marquis Cornwallis*, by W. Seton-Karr, in Hunter's 'Rulers of India Series' (1890).

**Coro**, tn., Venezuela, on the w. side of the Medanos isthmus. Founded in 1537, Coro was till 1578 the capital of the country, and since 1890 it has been the capital of the state of Falcon. It has rich coal mines; p. 15,533.

**Corocoro**, mining center in dep. of La Paz, Bolivia. The output is almost entirely copper ore. Alt. 13,195 ft.; p. 9,000.

**Corolla** is the second or inner layer of floral wrappings which encloses and protects the stamens and pistil of the flower. The separate parts or leaves which make up the corolla are known as petals. These are usually the most brightly colored of all the parts of a flower. Many flowers possess only a single layer of floral wrappings, but it is still called the calyx, or sometimes the perianth—a term strictly including both envelopes. When the petals are united to form a tube or funnel, the corolla is said to be gamopetalous; when, on the other hand, they are not united, it is said to be polypetalous. When, as in the buttercup, the petals of a flower are all equal, the corolla is regular; otherwise it is irregular, as in the bean and the dead-nettle. See FLOWER.

**Corollary**, in geometry, a proposition which depends so closely upon one previously proved that the truth is evident with little or no demonstration. Hence the word is used generally for an immediate inference or consequence.

**Coromandel Coast**, the southern portion of the e. coast of Madras Presidency, India. The name is a corruption of Cholamandalam, 'country of the Cholas,' a Dravidian people.

**Corona**, in architecture, a member of the

cornice of an order in any of its several parts, as in pier, door, pedestal, or window. It consists of a broad slab channelled upward and projecting, and protects the lower members of the structure in inclement weather. See CORNICE.

**Corona**, a solar appendage visible during total eclipses. It varies in shape with the progress of the sun-spot period. The corona is probably in the main composed of finely divided matter shot out from the sun, and acted upon by electro-magnetic forces. Its aspect can be closely imitated by the luminous effects produced in vacuum tubes placed in strong magnetic fields. The subtlety of its composition is proved by the unresisted passage of comets through the space occupied by its luminous radiations, among the most interesting of which is coronium (green), elsewhere unknown. *Corona* is also the name of the small colored ring which may be observed encircling the sun or moon when traversed by thin, filmy clouds.

The total eclipse which occurred in 1936 afforded a fine opportunity for the study of the corona. Several natural color photographs of the corona were taken for the first time. The spectrum analysis of the corona during this eclipse showed several new lines. See HALO.

**Corona**, in botany, an appendage on the top of the seed (as in the dandelion or thistle); or, more commonly, on the inner side of the corolla, as in the jonquil and daffodil.

**Corona Australis**, a small though ancient constellation. Placed on the border of the Milky Way near Sagittarius, it typified the crown of the zodiacal Centaur.

**Corona Borealis**, an ancient constellation e. of Boötes, imitatively named, and appropriated to Ariadne. The Arabic name, Alphecca, of the chief star, also called Gemma Coronæ, commemorates the prosaic resemblance of the group to a broken platter.

**Coronado, Francisco Vasquez de** (c. 1500?-c. 1549), Spanish explorer in America. He seems to have gone to Mexico in 1535, and was made (1539) governor of New Galicia by Viceroy Mendoza. In the same year he was selected to conduct an exploring party into the country that is now Arizona and New Mexico, the primary object being the discovery of the 'Seven Cities of Cibola' (now generally identified with the Zuñi pueblos). Coronado, with a large retinue, was engaged for two years (1540-2) in his vain search, and traversed a large extent of territory never previously

visited by white men. Consult Bancroft's *Arizona and New Mexico*; Winship's *Coronado Expedition* (1904).

**Coronation**, the placing of a crown on the head of a monarch at the beginning of his reign, is an ancient custom—as old as the time of Solomon, at least. The revival of the Roman Empire was marked by the memorable coronation of Charlemagne at Rome.

The most notable crowning of the present day, that of the British kings, takes place in Westminster Abbey, where the Scottish Stone of Destiny now rests under the coronation chair. The broadcasting of the coronation of George VI. in 1937 was the first instance of an international coronation broadcast by radio.

**Coronel**, seaport, province of Concepción, Chile, on the eastern side of Arauco Bay. It is the commercial center of a coal-mining district, a cable station and a port of entry, and has an excellent harbor and piers; p. 9,019.

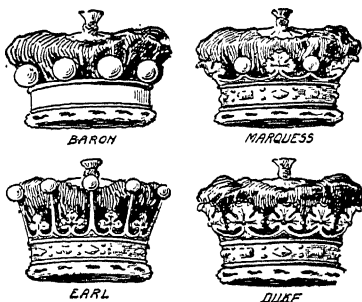
**Coronel, Battle of**, naval battle in the first World War, between a British squadron under Rear Admiral Sir Christopher Cradock and a German squadron under Vice Admiral Graf von Spee. It took place 40 m. w. of Coronel, Chile, and resulted in a severe defeat for the British forces.

**Coroner**. This office existed at least as early as 1194 in England. Originally, the coroner was second in rank to the sheriff, and performed the duties of that office, in addition to his own, during the sheriff's absence or disability. In the United States, coroners are either appointed or elected, and the duties are generally prescribed by statute. The chief duty of a coroner today is to hold an inquest on the dead body of any person lying within his jurisdiction, if there is reasonable ground to suspect that the deceased died a violent or unnatural death, or died suddenly from some unknown cause; or, if the deceased died in prison, or in such place or under such circumstances as to require an inquest.

In the United States, the finding of a coroner's inquisition may subject any one accused thereby to arrest, and the coroner may issue a warrant of arrest, but no one can be tried without the finding of a grand jury. Reports of the findings of the coroner's jury may not be used against the accused at his trial for the suspected crime. In some States (as Massachusetts), the office of coroner has been abolished and a medical examiner appointed by the governor in each county.

**Coronet**, a small or inferior crown, the distinctive state head-dress of the British no-

bility, and the symbol of their order. It consists of a chased circlet of gold, ornamented on its upper edge by conventionalized strawberry-leaves, pearls, etc. In early times the arrangement of these was arbitrary, but more modern usage has assigned a definite pattern to each grade of the peerage.



Forms of Coronet.

**Corot, Jean Baptiste Camille** (1796-1875), French painter, the most poetic and individual of landscapists, who combined the classical tradition of style with modern intensity of emotion, personal vision, and direct study of nature. Born in Paris of humble parentage, he began life behind the counter. He lived and studied nature for several years in Italy. Returning to France, he became a prominent member of the Barbizon group of painters, and was beloved for his geniality and generosity. He was given the Cross of the Legion of Honor (1846).

Corot's range was limited, but he found infinite variety of poetic vision within these imposed limits, expressed in a singularly refined and restricted scheme of delicate, quiet colors. Many of his paintings are in the United States. His *Ville d'Avray* is in the Metropolitan Museum in New York; the *Dante and Virgil* in the Boston Museum of Fine Arts; while other fine examples of his work are to be found in several private collections, in Philadelphia, in the Chicago Art Institute, and in the Corcoran Gallery at Washington. The most authoritative work on Corot is A. Robaut's *L'Œuvre de Corot* (1905), containing a catalogue of his paintings. Consult Robinson's 'Corot,' in Van Dyke's *Modern French Masters*; Meynell's *Corot and His Friends* (1910).

**Corporal**, a non-commissioned officer in nearly all the armies of the world. In the U. S. Army he is the lowest rank of non-commissioned officer. His duties are to place

and relieve sentineis, to keep discipline in barracks and camp, and to take command of a squad or part of a company.

**Corporal**, in Roman Catholic and Anglican churches, the linen cloth spread on the altar on which the vessels containing the sacred elements of the Eucharist are placed. The veil covering the chalice after the sacrament is sometimes called the corporal.

**Corporal Punishment**, the infliction of direct bodily pain as a penalty for or deterrent from crime or misdemeanor. Physical suffering was formerly looked upon as a necessity for maintaining order, and such punishments as branding, mutilation, and the various forms of torture were universal and unquestioned. As civilization advanced, however, these cruel practices were gradually discarded, and today flogging or whipping is the only form in which actual corporal punishment exists. Its chief application today is in the disciplining of prison inmates. See PUNISHMENT; WHIPPING.

**Corporal's Guard**, in military language, is a small body of soldiers under the charge of a corporal. It is also used derisively of any small following or party.

**Corporation**. Legally, a corporation is an artificial person created by the state. In the United States corporations are created by act of legislature, either by special act or under general laws authorizing persons who have conformed to prescribed conditions to form a corporation. The general powers of a corporation are specified in its charter and in the provisions of the statutes under which it is organized. As a legal 'person' it can sue and be sued, entirely apart from the personality of its stockholders. It is likewise entitled to 'due process of law' and to the 'equal protection of the laws' under the Fifth and Fourteenth Amendments to the Federal Constitution. The executive control of a corporation is ordinarily placed in the hands of a board of directors, elected by the stockholders, in accordance with provisions of the charter. The president and other administrative officers are appointed by the board.

Corporations are usually classified for legislative purposes as public, as municipalities and incorporated villages, and private. Private corporations, in turn, are classified as beneficiary, or corporations not organized for profit and corporations organized for profit. The statutes generally provide different types of organization, with differences in powers and responsibilities, for each of these classes. In numerous specific fields, as public

service industries, banking, building and loan, insurance, and real estate, corporations are subject, also, to more detailed and varied types of regulation. The growth of corporate organization has been one of the most conspicuous features in the development of society in Europe and America, on its institutional side, during the past century. This growth has been most striking in industry, but only less striking in the fields of religion, art, science, and general social organization. Probably its greatest value has been its special adaptability for attracting and administering large aggregations of capital, which has made possible the advantages of large-scale production.

The growth of corporations in America in recent years has been remarkable. Practically all of the steam railways, electric railways, and telegraph properties of the United States are under corporate ownership. In the telephone field, the capital structure of one large corporation represents 85 per cent. of the total capitalization of the industry. Of the 3,774 electric light and power establishments in the United States listed in a recent year, 73 per cent. were owned by incorporated companies; but this 73 per cent. of the plants produced 99.8 per cent. of the total number of kilowatt hours generated by all companies.

One of the most significant recent developments in the field of corporate organization is the extensive development of the holding company, a corporation organized for the purpose of acquiring the securities of other corporations. This means ordinarily acquisition of controlling stock in operating companies, which carry on the actual industrial operations in the field concerned. The development of the holding company in the United States began with the enactment of the New Jersey Corporation Act of 1889, permitting corporations organized thereunder to acquire the securities issued by corporations of other States and to carry on business in other States with the full legal status of New Jersey corporations. Under this Act the Standard Oil Company and numerous so-called trusts, which had encountered legal difficulties elsewhere, reorganized as New Jersey holding companies. In recent years the holding company type of organization has developed to such a point that specialization has appeared within the field. Three general types of holding company may be distinguished: the investment company, organized for the purpose of distributing investments

over a wide field of diversified industries; the finance company, organized for the purpose of financing operating companies or business concerns, usually in specialized industries; and the management company, organized usually by engineering groups in the public-utility field, for the purpose of holding interests in operating companies whose management they control. It is in the field of railways and public utilities that the most striking development of the holding company type of organization in general has taken place.

Another significant development of recent years is the great diffusion of corporate ownership that has taken place. This has been brought about largely by the specific efforts of public utility and many other large corporations, where public relationships have become an important factor, to secure a wide distribution of their securities among their employees and customers, commonly referred to as customer ownership and employee ownership. More or less associated with this diffusion of security ownership have come material changes in the capital structure of corporations, involving particularly the issue of a great variety of securities under such designations as income, adjustment, and debenture bonds; first and second, cumulative, guaranteed, and participating preferred stock; prior preference stock, and non-voting common stock. The effect has been to increase the diversity of inducements offered to investors, but to limit the voting control to a smaller portion of the capitalization. This tendency to divorce ownership from control, particularly by the issue of non-voting stock, has been severely criticized by some authorities; and the Interstate Commerce Commission has indicated disapproval of too great a concentration of voting control in the capitalization of railways.

Along with changes in corporate organization has come an increasing amount of regulation of corporate organization and activities by the States. This has taken the form generally of regulation of capitalization and sale of securities, beginning with the 'blue sky' law of Kansas, 1911. Since then, few if any states have failed to enact laws of this character. There is also the Federal Securities Exchange Act. Consult A. S. Dewing's *The Financial Policy of Corporations* (1921); H. L. Reed and A. A. Young's *Principles of Corporation Finance* (1925).

**Corporation Tax**, any form of taxation that is levied on the basis of characteristics

peculiar to corporations, as taxation of corporate charters, franchises, capitalization, and dividends; or any form of taxation levied upon corporations only, as distinguished from individuals and partnerships, as a corporate income tax. The most important special corporate taxes are: Fees and licenses, such as the organization fees charged for the privilege of incorporation or for increases in capitalization, and the filing fees charged when a corporation chartered in one State applies for the privilege of carrying on business in another. Franchise taxes, which may take almost any form, but are legally construed to be either excise taxes upon the exercise of corporate privileges or property taxes upon the value of these privileges. Capital stock taxes, levied usually at a fixed rate upon the amount of capital stock outstanding or the total capitalization, including the bonded indebtedness. Gross earnings taxes, levied upon the total earnings. Net income taxes, both Federal and State. See INCOME TAX. For general subject, see TAXATION.

**Corps, Army.** See **Army Corps.**

**Corpse**, the dead body of a human being. In law a corpse is not looked upon as a person, that which constitutes a person being separated from the body by death. Unless other provision is made by will, the disposition of a dead body devolves upon the surviving husband or wife, the next of kin, or, in the absence of these, upon the person in whose house death occurred. For the care and disposition of the dead, see BURIAL; CREMATION; EMBALMING.

**Corpus Christi**, one of the chief festivals of the Roman Catholic Church, was instituted in 1264, in honor of the Consecrated Host, by Pope Urban IV., who appointed for its celebration the Thursday after the festival of the Trinity, and promised to all the penitents who took part in it indulgence for a period of from forty to one hundred days. In Roman Catholic countries the festival is distinguished by magnificent processions. In the United States and some other countries it is celebrated on the Sunday following Trinity Sunday. At the time of the Reformation it was removed from the Anglican calendar.

**Corpus Christi**, city and port of entry, Texas, county seat of Nueces co., on Corpus Christi Bay. It has a good deep-water harbor recently improved at a cost of \$1,000,000 shared by the Federal, State, and city governments. There is a considerable trade, and fishing and manufacturing are impor-

tant industries. The city is also well known as both a winter and summer resort. Commission government was adopted in 1909; p. 57,443.

**Corpus Christi College.** See **Cambridge**; **Oxford**.

**Corpus Delicti**, a legal term denoting the essence or substance of the crime or offence charged, which must be proved before a conviction can be obtained. For instance, when homicide is the crime charged, the death must be proved affirmatively. In most jurisdictions, by statute, the body must have been found and identified; a confession alone is not enough. This rule applies to prosecutions for all crimes.

**Corpus Juris Civilis**, the title given to the whole body of the Roman law included in the *Institutes*, the *Digest* or *Pandects*, the *Code*, and the *Novellæ*, all of which were published in the 6th century under the auspices of the Emperor Justinian. It was the basis of the law of mediæval Europe, and of the civil law prevailing on the Continent to-day.

**Correggio, Antonio Allegri** (c. 1494-1534), one of the greatest of the Italian Renaissance painters, was born in the town of Correggio, the son of a merchant named Pellegrini Allegri. He is believed to have learned the rudiments of painting from his uncle, Lorenzo Allegri, an artist of mediocre ability. In 1511 he went to Mantua, where he spent several years, probably studying the works of Mantegna. He returned to Correggio in 1514, and in 1518 went to Parma, where he had been commissioned to decorate with frescoes the convent of San Paolo. There he remained for ten years or more, executing the frescoes for the cupola of San Giovanni (1520-24) and for the cathedral (1526-30). He returned to Correggio in 1530, and there spent the rest of his life. Correggio was married in 1520 to Girolama Merlini, who seems to have been the model for some of his Madonnas.

Correggio's work is characterized by marked individuality and superb technique. He shows an extraordinary knowledge of perspective and of anatomy. His painting of flesh tints is unrivalled, and he excels in the treatment of light and shadow. His frescoes are perhaps his masterpieces.

Among his works are the *St. Francis Madonna* in Dresden; *The Marriage of St. Catherine* in the Louvre; *The Madonna della Scodella*, in Parma; the *Holy Family in Egypt*, and *Madonna Adoring the Child Jesus*, in

the Uffizi, Florence. Consult Brinton's *Correggio* in 'Masters of Painting and Sculpture' Series.

**Corregidor**, in Spanish America, either the chief officer of a *corregimiento* or district, or a magistrate having the right of enforcing the law in special cases.

**Corregidor Island**, a small fortified island at the entrance to Manila Bay, Philippine Islands; an army and hydroplane station and the first post of the inner defense of Luzon. Attacked by the Japanese, it fell in May, 1942; p. about 500.

**Correlation of Parts**, an interesting problem of biology first expressed by Cuvier, who pointed out that certain organs are so correlated that a change in one, brought about through changes in use, involves a change in another. For example, the cleft hoof is always associated with certain forms of teeth and with the stomach of a ruminant. Sharp claws of flesh-eating animals are associated with sharp teeth and an alimentary tube adapted for a diet of flesh. Further examples will be found in A. R. Wallace's *Darwinism* and Darwin's *Origin of Species*.

**Correnti, Cesare** (1815-88), Italian statesman, was born in Milan, and did good service to his country by his numerous pamphlets inciting his fellow-countrymen to free themselves from the Austrian yoke. He was made councillor of state in the first Italian Parliament (1860), and was created senator (1886).

**Correspondence Courses.** *Correspondence Schools* are schools, conducted usually under private management and for profit, which give instruction in vocational, academic, or cultural subjects to non-resident students through communication by mail. Though developed in America, the germ of the idea originated in England, where direct instruction of the university extension type began in 1868. The Society to Encourage Studies at Home, founded in Boston in 1873, was the first actually to furnish correspondence instruction to members. In 1883 a 'Correspondence University,' formed by a number of college and university instructors, with headquarters at Ithaca, New York, offered instruction by correspondence to the public. At about this same time Dr. William Rainey Harper was giving courses of instruction in Hebrew by mail in connection with his work as professor of Hebrew in the Baptist Union Theological Seminary. Appointed to a professorship at Yale, he continued the work there, and in 1892, when he assumed the presidency of the newly founded Univer-

sity of Chicago, introduced correspondence instruction as a regular part of university teaching. Within sixteen years this department of the university had enrolled 2,386 students, with 135 teachers giving instruction in 335 courses. In 1878 a plan was formed for extending the educational benefits of the popular summer assemblies on the shores of Lake Chautauqua, New York, to a wider following, and the Chautauqua Literary and Scientific Circle was launched. This movement, in which members, widely separated, pursued a uniform course of reading, was so successful that in the first twenty-four years of its existence 260,000 persons were enrolled, a large number of textbooks were published, and the aid of leading scholars in many fields was enlisted. (See CHAUTAUQUA.)

Labor came into its share in correspondence study through the interest of a newspaper editor in Shenandoah, a mining town of Eastern Pennsylvania. Recognizing the need of aid to mine foremen in preparing for examinations given by the Mine Examining Board, he devoted a regular department of his newspaper to questions and answers relating to the principles of mining and accident prevention. Out of this beginning evolved in 1891 a course of study which in time became a complete course in coal mining. As the demand for diversified vocational instruction grew, the work was organized into the first commercial correspondence school, which in time grew into the largest institution of its kind in the world, the International Correspondence Schools, with courses in more than two hundred subjects and a student enrollment in every civilized country, totaling in twenty-five years upwards of 1,500,000 persons. Similar vocational courses were utilized for the instruction of partially disabled American soldiers after the World War, the Federal Government paying the expense of such correspondence instruction under a provision of the Smith-Sears Act.

The growth of correspondence instruction as a part of university extension has been steady, and adapted to a variety of needs. In a recent year correspondence courses were reported from 73 institutions of higher education in 39 States. A recent application of the idea comes from the vast and sparsely settled province of British Columbia, in Western Canada, where by means of the mails schooling has been taken to the children of isolated miners and lumbermen as far n. as the Alaska boundary. One of the most recent outgrowths of the correspondence idea is

instruction by radio-correspondence by the University of Iowa. A series of twelve lectures of fifteen minutes each is broadcast at times previously announced. From a syllabus sent them by mail the students work out the assignments and mail them to the extension division of the university for correction and return. For information concerning any desired course, write the U. S. Bureau of Education.

**Corrèze**, department in Southwestern France, on the slope of the central plateau, to the w. of the mountains of Auvergne; area 2,265 sq. m. The soil is chiefly granitic and the climate cold, but the lower valleys are fertile and picturesque. The chief crops are rye-grass, chestnuts, walnuts, wheat, oats, and maize; and grazing is important. Arns are manufactured at Tulle, the capital; p. 273,808.

**Corrib, Lough**, large islet-studded lake, Ireland, in county Galway. Next to Lough Neagh it is the largest sheet of water in the country, having an area of nearly 70 sq. m. It receives through remarkable underground passages, such as the 'Pigeon Hole,' the surplus waters of Loughs Carra and Mask toward the n. Through Galway River it drains into Galway Bay.

**Corridor**, a gallery in the internal distribution of a building round which the various apartments are grouped. It is sometimes open on one side, but is more often enclosed by roof and walls.

**Corrie**, a name applied in the Scottish highlands to an amphitheatre-shaped niche in a mountain side, with steep walls on three sides, and with the floor not continuous with the main valley below.

**Corrientes**, province, Argentine Republic, lying between the rivers Paraná and Uruguay adjacent to Paraguay and Brazil; area 33,535 sq. m. It is a level country, and abounds in swamps and lakes. The chief river is the Corrientes (120 m. long). The forests yield valuable timber, and grazing is the chief occupation; p. 421,480.

**Corrientes**, town, Argentine Republic, capital of the province of Corrientes. It is an interesting old town with attractive shaded streets and villas. It has a trade in fruit and lumber; p. 45,000.

**Corrigan, Michael Augustine** (1839-1902), American Roman Catholic archbishop, received his theological education as one of the original students in the American college in Rome. He was professor (1864-8) at, and later president (1868-73) of, Seton Hall Col-

lege, South Orange, N. J. In 1873 he was appointed bishop of Newark. In 1880 he was made coadjutor to Cardinal Archbishop McCloskey of New York, on whose death (1885) he became archbishop of New York, receiving the pallium in 1886.

**Corroboree**, a generic name given by the Australian aborigines to a nocturnal convention, accompanied by wild dancing round the camp-fire and other rites. Corroborees are held on all great occasions.

**Corrosive Sublimate, Mercuric Chloride**, or **Bichloride of Mercury**, is made by subliming a mixture of mercuric sulphate and common salt. It forms white crystals which are moderately soluble in water and alcohol, and is a powerful corrosive poison. Its antidote is white of egg, with which it forms an insoluble compound. It is one of the most powerful antiseptics known, a solution, 1 in 1,000, being used to render aseptic the instruments, dressings, used in surgery.

**Corrugated Metal**, a term applied to sheets of iron or other ductile metal which have been pressed or rolled into a series of equal waves. For out-of-door use corrugated iron is usually galvanized with zinc to increase its durability. Its most extensive commercial use is for roofs of buildings where lightness, portability, and cheapness are first considerations.

**Corruption of Blood.** See **Attainder**.

**Corrupt Practices Acts.** See **Elections**.

**Corry**, city, Pennsylvania, Erie co.; has dairying interests, manufactures steel, lumber, leather, flour, brick, furniture, and engines and ships petroleum, discovered here in 1860. A State fish hatchery is located here; p. 6,935.

**Corsair**, a small, edible fish common in Southern California. It is one of the rockfish species, bright red and golden in color.

**Corsairs**, the cruisers of the Barbary States, to whose attacks the ships and coasts of the Christian countries of the Mediterranean were continually subjected. In English the word has often been considered as identical with pirate, but inaccurately, since the activities of the Saracen and Turkish corsairs were recognized by their governments as part of their settled policy towards Christendom. The principal strongholds of the Corsairs were Algiers, Tunis, and Morocco; the most famous of them were the Anatolian Turks, Khair ed-Din, known as Barbarossa, and Uruch, his brother, who flourished in the beginning of the 16th century, and Dragut, also a native of Asia Minor who succeeded Barbarossa. The term is now loosely used

of any pirate or freebooter, or of their vessels. See **BARBARY STATES**.

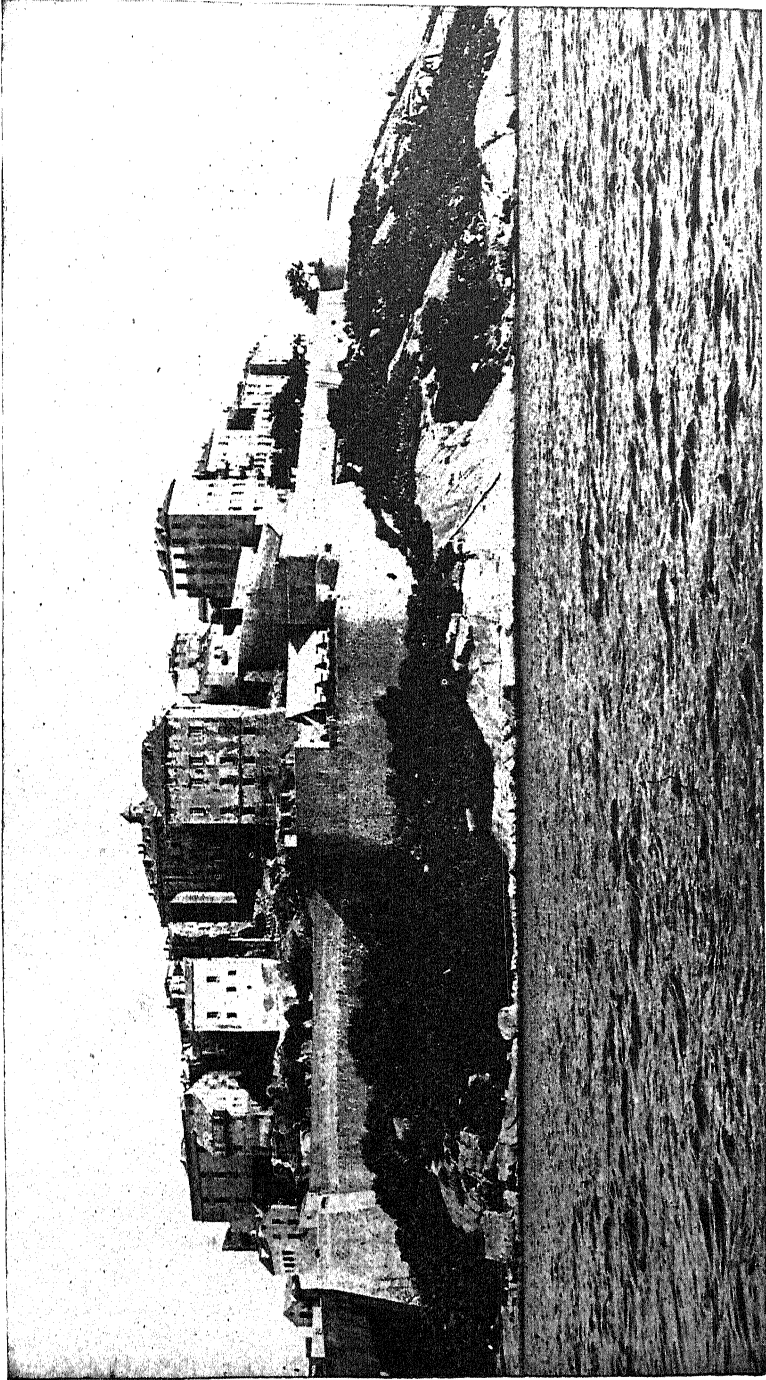
**Corset**, an article of dress worn generally by women as a means of support to the figure. Corsets were invented in Germany and introduced into France about the time of the Revolution. Modern corsets are generally made of jean, coutil, batiste, silk, or elastic webbing, reinforced by narrow pieces of whalebone or steel, or by bands of stitched material. Corrective corsets find a wide therapeutic application in spinal and other deformities.

**Corsica**, (Fr. *Corse*), island in the Mediterranean Sea, 8 m. n. of Sardinia, 51 m. w. of the coast of Italy, and 110 m. s. of the French coast. It belongs to France, of which it forms a department. It is about 114 m. long and 50 m. wide, with an area of 3,367 sq. m. Except for a zone of low and malarial ground along the e. coast, the entire surface is mountainous. The highest point in the island is Monte Cinto (8,890 ft.); the best-known peak is Monte Rotondo (8,775 ft.). In striking contrast to the e. coast, the precipitous w. coast is remarkably picturesque. The slopes are luxuriantly wooded, with palms at the shore line, fine larches above, and maquis, or scrub, on the heights. The Gulf of Porto, with its brilliant blue waters, is one of the beauty spots of the island. Chestnut and olive trees grow in abundance, and orange and other citrus fruits, vines, cereals, and mulberries are produced. The chief exports are olive oil, wine, honey, chestnuts, and fruit. Fishing for sponges, pilchard, and tunny is a leading industry, as is the extraction of gallic acid from chestnut bark. The principal towns are Ajaccio, the capital, birthplace of Napoleon I.; Bastia, Corte, Bonifacio, and Calvi.

The early inhabitants appear to have been akin to the Iberians and Ligurians; later settlements were formed by Etruscans, Carthaginians, and Greeks. From the Carthaginians the island passed (265 B.C.) into the hands of the Romans. After the fall of Rome it was under the Vandals, Ostrogoths, Byzantines, Franks, and Saracens. In the middle 1300's it passed to the Genoese, who in 1768 sold it to France. It was English, 1793-1796. Occupied by the Italians, 1940; retaken by the Fr. Sept., 1943; p. 322,854.

Consult Caird's *History of Corsica*; Chapman's *Corsica*; Archer's *Corsica, the Scented Isle* (1924).

**Corsicana**, city, Texas, county seat of Navarro co.; the seat of the State Orphans'



*Copyright Burton Holmes, from Ewing Galloway, N. Y.*

*Corsica: The Town of Calvi on the Northwest Coast, with its Sea Wall.*



Home and an Odd Fellows Orphans' Home. The surrounding district yields farm products, cotton, livestock, and petroleum, for which the city serves as a central market. The first continuing oil production in Texas is said to have been located within the city limits in 1894, and the first oil refinery in the State was established here; p. 15,200.

**Corsite**, also known as **Napoleonite**, a variety of diorite, obtained near Ajaccio, Corsica. When cut through and polished it makes a beautiful ornamental stone, showing on its surface groups of rounded spots an inch or more in diameter which, on minute examination, are seen to consist of crystals radiating from a centre.

**Corslet**, a breastplate, light cuirass, or sleeveless coat of mail or leather, worn by foot-soldiers in the 16th and 17th centuries.

**Corso**, the Italian 'race' or 'race-course,' applied sometimes to the main street of a town. The most famous is the Corso at Rome, the ancient *Via Flaminia*, nearly a m. in length, along which, during carnival, processions of maskers and gaily decorated carriages pass, waging mimic warfare with flowers and confetti.

**Corson, Hiram** (1828-1911), American educator. He was assistant librarian of the Smithsonian Institution at Washington, and lecturer at Girard College, Philadelphia, until his acceptance of the professorship of English literature in St. John's College, Annapolis, Md., in 1866. In 1870 he was appointed professor of English literature at Cornell, a position which he held until 1903. His best-known books are *An Introduction to the Study of Robert Browning's Poetry* (1886) and *An Introduction to the Study of Shakespeare* (1889).

**Cort, Cornelis**, (c. 1533-78), Dutch engraver, was born in Hoorn. His work includes engravings of paintings by Raphael, Titian, Michelangelo, Clovio, and other famous artists.

**Cortelyou, George Bruce** (1862-1940), was secretary to Presidents McKinley and Roosevelt, 1898-1903, and subsequently, Chairman of the Republican National Committee (1904-07), Postmaster General (1905-07), and Secretary of the Treasury (1907-09).

**Cortes**, the name given to the legislative authority in Spain. It consists of a Senate and a Congress or Chamber of Deputies. The Portuguese legislature is also known as the Cortes. See SPAIN; PORTUGAL.

**Cortes, Hernando**, (1485-1547), Spanish

soldier and conqueror of Mexico, was born in Medellin, a village of Estremadura, Spain; distinguished himself under Velasquez in the conquest of Cuba, 1511. Having been commissioned by Velasquez to undertake the conquest of Mexico, newly discovered by Juan de Grijalva, he set sail from St. Jago de Cuba, February 1519. He had barely touched at Trinidad when Velasquez sent orders to supersede him. Disregarding these, Cortes landed at Tabasco, March 25, and sailed along the coast until he reached what is now Vera Cruz. Against Cortes and his army the Cholulans, allies of Montezuma, chief of the Aztecs, after receiving them, formed a plot; but Cortes circumvented their treachery, destroying large numbers of them without losing a soldier. Marching now to Tenochtitlan, the Aztec capital, Cortes and his men were received there, Nov. 8, 1519, as divinities. Although similar conflicts with the Aztecs, the Tlascalans and with rival Spanish expeditions, recurred frequently, Cortes remained successful and his control was unbroken.

Cortes developed the mining and agricultural interests of the country, rewarding his men with grants of land, and pursuing generally a sagacious plan of colonization. Appointed governor and captain-general of New Spain in 1522, he dispatched expeditions which conquered Guatemala and Honduras. Superseded in the governorship by Estrada, Cortes went to Spain to answer his accusers, and the king created him Marquis del Valle de Oaxaca in 1528, and continued him as captain-general but not as civil governor of Mexico. Returning to Mexico in 1530, he discovered Lower California, 1536, and for ten years continued to send out exploring expeditions, but in 1540 returned to Spain. He was buried at Seville, but his remains were afterwards conveyed to Tezcucio, in Mexico.

Consult W. H. Prescott's *History of the Conquest of Mexico*; Helps' *Life of Cortes*.

**Cortes, Sea of**. See **California, Gulf of**.

**Cortissoz, Royal** (1869- ), Am. journalist and art critic, born N. Y. City; became art editor of the *New York Tribune*, a contributor to magazines, and a lecturer on art. His published work includes *Art and Common Sense*, 1913; *Life of Whitelaw Reid*, 1921; *American Artists*, 1923. He has also edited *Don Quixote* and *The Autobiography of Benvenuto Cellini*.

**Cortland**, city, New York, county seat of Cortland co., on the Tioughnioga River. Its manufactures include drop forgings, wire, wire cloth and screens; p. 16,113.

**Cortona**, town and episcopal see, Italy, in the province of Arezzo, on the e. side of the Val di Chiana. The town is still, for the most part, surrounded by the ancient Etruscan walls; it has a museum of Etruscan antiquities, a cathedral, and several ancient churches with pictures by Luca Signorelli, Fra Angelico, Pietro da Cortona, and others. Cortona, formerly one of the leading cities of the Etruscans, was subjugated by Rome about 309 B.C.; p. 29,659.

**Corumba**, town, Brazil, in the state of Matto Grasso, on the w. bank of the Paraguay River. The Brazilian naval arsenal, Ladarario, stands on the opposite side of the river; p. 30,385.

**Coruna**, province, Spain, in the n.w. part, with an area of 3,051 sq. m. Its extent of indented coast on the Atlantic affords numerous fine fiord-like harbors. Fisheries are important and profitable, and food-preserving for export is carried on; p. 719,960.

**Coruna**, known to British sailors as THE GROVNE, city and seaport, Spain, capital of the province of Coruna. The harbor is deep and safe, and there is a large export trade; p. 68,188.

Coruna is of Iberian origin and corresponds to the Roman Brigantium. From here the Great Armada sailed for England in 1588. The place was besieged and partly sacked by the English in 1598; off the coast the French were defeated by the English fleet in 1747, and again in 1805; in the neighborhood the British, under Sir John Moore, in 1809 repulsed the French, at which time Sir John lost his life. In 1823 the city was occupied by the French.

**Corundum**, a non-metallic, mineral consisting of alumina, ( $Al_2O_3$ ). It is the second hardest mineral known, and occurs in barrel-shaped hexagonal crystals and also in compact granular and lamellar masses. Transparent crystalline varieties are valuable as gem stones. Opaque granular corundum mixed with hematite or magnetite is known as emery. The principal demand for emery and corundum is for the grinding of optical glass, for which artificial abrasives cannot be substituted. The greater part used in the United States is imported.

**Corvallis**, city, Oregon, county seat of Benton co., on the Willamette River; the seat of the Oregon Agricultural College. The chief manufactures are lumber, furniture, and flour; p. 8,392.

**Corvée**, a system of compulsory labor exacted from feudal inferiors, which from the

Middle Ages onwards was more or less prevalent throughout Central Europe. The demand for arbitrary *corvée* by the feudal lords of Germany, in the 15th and 16th centuries, led directly to the outbreak of the Peasants' War of 1525. In Mecklenburg, obligations of this kind endured to near the middle of the 19th century; as they also did in Denmark, Roumania and Russia. In Egypt the Nile barrage, some twelve m. above Cairo, was built by *corvée* labor, and year by year the canals in connection with it were cleaned out by *corvées* of 20,000 men; but under British rule *corvée* was finally abolished in 1891.

It is from the institution as it existed in France before the revolution that the name *corvée* is specifically derived, but it was finally and definitely abolished on Aug. 4, 1789.

Consult Fustel de Coulange's *Histoire des institutions politiques de l'ancienne France*.

**Corvey**, a famous Benedictine abbey in Germany, on the banks of the Weser, near Höxter. It was founded about 822 by Louis the Pious, its first inmates being monks from Corbie in Picardy. Directly under the Pope until 1793, it was converted into a bishopric by Pius vi. It was secularized in 1803, and was successively ceded to Nassau Orange, to Westphalia, 1807, and to Prussia, 1815.

**Corvidæ**, a large, widely distributed family of birds, which includes crows, ravens, magpies, and choughs.

**Corvo**, the most northern and smallest of the Azores; 12 m. n. of Flores; p. about 750.

**Corvus, Marcus Valerius**, (c. 371-271 B.C.), Roman general, was twice dictator of Rome, and six times consul. He defeated the Gauls, the Volsci, the Samnites, the Etruscans, and the Marsi. He is said to have won his surname Corvus, 'Raven,' from the fact that in 349, by the aid of a raven which flew at his foe's face, he slew a huge Gaul.

**Corwin, Edward Tanjore**, (1834-1914), American clergyman, and historian of the Reformed Dutch Church, was born in New York city, he published *Manual of the Reformed Protestant Dutch Church in North America*, 1859-1902, and *History of the Reformed Church, Dutch, in America*, 1895.

**Corwin, Thomas** (1794-1865), American political leader and orator, was born in Bourbon co., Ky.; became governor of Ohio, a member of the U. S. Senate, Secretary of the U. S. Treasury in 1850-3, and was U. S. minister to Mexico during the Civil War. Consult Morrow's *Life and Speeches of Thomas Corwin*, and Russell's *Thomas Corwin*.

**Cory, William Johnson** (1823-92). Eng-

lish schoolmaster and poet, was born in Torrington, Devon. Besides some technical books on verse composition, he published, in 1858, a volume of poetry, *Ionica*.

**Coryate, Thomas** (1577-1617), English traveler, was born in Odcombe, Somersetshire. He lived for a time about the court of James I. as a kind of privileged jester, and later travelled on foot through Europe, publishing his experiences in *Coryate's Crudities*, a valuable record, despite the satirical panegyrics which his friends prefixed to it. In 1612, after hanging up his old shoes in Odcombe church, he set out anew on his travels, proceeding through Asia Minor, Persia, and Kandahar to Agra in India. He died in Surat.

**Corybantes**, priests of the Phrygian Cybele or Rhea, who celebrated her worship with wild dances to the music of the cymbals and drum.

**Corydalis**, a genus of hardy annual and biennial herbs, belonging to the order Fumariaceæ, bearing attractive spur-shaped flowers and finely divided leaves.

**Corydalis**, or **Dobson**, a curious insect belonging to the family Sialidæ. It occurs in North America, where the fly is often called 'hell-grammite,' and the larva, which is frequently used for bait, is known as 'crawler' or 'hell devil.'

**Corymb**, a flat-topped inflorescence in which the terminal or apical flowers are the youngest, the flower-bearing axis is lengthened, and the flowers stalked.

**Coryphæna**, a genus of bony fishes, particularly known as dolphins. See DOLPHIN.

**Coryphæus**, the leader of a chorus or company in a play; also the leader of a party.

**Coryza**, or **Rhinitis**, an inflammatory condition of the mucous membrane of the nose, attended by an increased discharge of mucus or muco-purulent fluid. It occurs independently, as the common cold, is characteristic of such conditions as hay fever or hay asthma, and is seen in the initial stages of such diseases as measles, whooping-cough, and influenza.

**Cos**, or **Stanchio**, island in the Ægean Sea. It lies s.w. of Asia Minor at the entrance to the Gulf of Cos, and is 21 m. long and about 5 m. wide. It is the birthplace of Hippocrates. Important excavations have been carried on, and interesting discoveries made; p. 15,000. Cos was early colonized, was a member of the Athenian League, and enjoyed considerable prosperity. In 1523 it was captured by the Turks, and in 1912,

during the Turco-Italian War, was occupied by Italy.

**Cosa, Juan de la** (c. 1450-1509), Spanish navigator, thought to have been born in Santona, Calabria, Italy. He accompanied Columbus as pilot in 1492, and later was sent on several expeditions to explore the newly discovered lands. He is chiefly remembered for two colored maps designed by him on vellum, one marking out the lands discovered by Columbus and his successors, the other the Spanish possessions in Africa he had visited.

**Coscinomancy**, an old form of divination. A sieve was either suspended from or fixed on the points of a pair of shears, when a diviner uttered the names of the suspected persons. If the sieve trembled at one of the names, the person bearing it was considered guilty.

**Cosely**, town, England, in Staffordshire. It has iron and cement works and collieries; p. 24,207.

**Cosenz, Enrico**, (1820-98), Italian soldier and public official, was born in Gaeta.

**Cosenza**, province in Calabria, Southern Italy, in the northern part of the Calabrian peninsula. The northern parts are occupied by the Calabrian Apennines, and the southern parts by the Sila. Tin, lead, silver, and other minerals are found in the Sila Mountains; p. 550,490.

**Cosenza**, town and archiepiscopal see, Italy, capital of the province of Cosenza, is situated at the confluence of the Busento and the Crati; features of interest are the castle, several times shattered by earthquakes; the 13th century cathedral; and academy of science and arts. The town is a centre for trade in silk and agricultural products and manufactures cutlery, majolica, and textiles; p. 35,814.

**Cosgrave, William Thomas** (1880- ), Irish politician, born in Dublin, entered the grocery trade at an early age. He became interested in the Sinn Féin movement, took part in the Easter rising, 1916, and was imprisoned. He was a member of the first Dail Eircann which declared for an Irish republic. His promotion in 1922 to President of the Irish Free State came rapidly through an unusual series of events. He represented Ireland when that country first took part in a conference of the Dominions in 1923. He was defeated in 1932 by Eamonn de Valera, having served for ten years as President of the Executive Council, and having seen Ire-

land progress steadily forward under his guidance. In 1928 he visited America and was invited to address the U. S. Senate.



William T. Cosgrave.

**Coshocton**, city, Ohio, county seat of Coshocton co.; is a manufacturing centre and a trade centre for agricultural produce; p. 11,482.

**Cosimo, Piero di** (1462-1521), Italian painter. His best works include a *Conception* and *Madonna* at Florence, Uffizi; *Death of Procris*, National Gallery, London; *Coronation of the Virgin*, Louvre; *Wedding of Perseus*; *Rescue of Andromeda*.

**Cosin, John** (1594-1672), bishop of Durham, was born in Norwich. Though a ritualist, he was as much the enemy of Roman Catholicism as of Puritanism. He incurred great odium by opposing the representation of the Palatinate in Parliament. Among his works are *Collection of Private Devotions*, 1627; *Notes on the Book of Common Prayer*, 1710.

**Cosmas**, surnamed **Indicopleustes**, an Egyptian traveller, was born in Alexandria in the 6th century. As a merchant trading with Ethiopia and Asia, he gathered material for his work on *Christian Topography* which is valuable for its geographical notes. It was translated into English and published by the Hakluyt Society in 1897. The theories there set forth as to the earth's shape, the solar system, etc., are highly absurd.

**Cosmas and Damian**, Arabian Christian martyrs, were born in Arabia in the 3rd century; practised as physicians in Cilicia, where

they were noted for kindness to the poor. They were beheaded in the persecution under Diocletian, were canonized, and their bones taken to Rome, where a church was dedicated to their memory. They are the patron saints of physicians and surgeons.

**Cosmetics**, a general term applied to all preparations used for beautifying the skin and the hair. Skin preparations in general comprise face and talcum powders, rouges, lip salves, creams, and lotions. Face powders are of three kinds, rice powders, mineral powders, and a combination of the two. Rice powders contain over 50 per cent. of rice starch, to which are added some maize starch, some talcum, and a small amount of zinc stearate and sometimes zinc oxide. Mineral powders are composed largely of talcum; they are usually heavy, and are made chiefly for export to hot countries. Talcum powders are useful in allaying irritation of the skin. They contain a large proportion of talc, and are perfumed in the same way as face powders. Rouge is composed mainly of zinc oxide with the addition of chalk and sometimes starch, colored by one of the aniline dyes.

Lip salves are used both to prevent chapping and cracking and to give color to the lips. White lip salve, used chiefly for its healing properties, is made of white beeswax, lanolin, spermaceti, liquid paraffin, cocoa butter and other ingredients in various combinations. Rouge sticks, which are used for coloring, are made of the same ingredients as the white salve, with the addition of carmine pigment. Lip jellies are made by using gelatine as a solidifying agent, adding a large percentage of glycerine, a small amount of formaldehyde, and a little rose otto, with carmine if a rouge jelly is desired.

Skin creams and lotions comprise cold creams, vanishing creams, lanolin creams, almond creams, bleaching lotions, and other similar preparations. Cold creams are emulsions in which the fat predominates and a cooling effect is produced by the slow evaporation of the water content. The bases of cold creams are liquid paraffin, lanolin, and white wax. Borax is sometimes added as an aid to emulsification, and zinc oxide imparts an added whiteness. Vanishing creams, so called because, if properly made, they disappear when rubbed into the skin, consist of stearic acid partially saponified with an alkali, the main constituent being water. The best creams are delightfully fragrant, great care being taken to use only such material

as will not discolor the cream and will impart a fresh and lasting perfume. Skin lotions frequently contain small quantities of mercuric chloride and are generally opalescent or even milky solutions. Bleaching lotions are generally prepared with hydrogen peroxide.

Preparations for the hair comprise bay rum, brilliantines, curling applications, tonics, restorers, depilatories, shampoos, and dyes. Curling applications are made with alkaline carbonates or borax with a gum added, and are supposed to saponify the natural fat of the hair so that when it dries the curl will be more permanent. Depilatories to remove superfluous hairs consist principally of freshly prepared barium sulphide and starch made into a paste and applied to the skin.

Hair tonics are applied in the hope of increasing the growth of hair. Among the ingredients most used in the manufacture of hair tonics are pilocarpine, cantharides, quinine, rosemary oil, glycerine, tartaric acid, and ammonia. Dry shampoos are made without any soap and contain starch, orris, and other similar substances. Liquid shampoos are generally made of soft soap, alcohol, saponin, and water, with perfume added. Coconut oil shampoos and pine tar shampoos are popular. The former are made by saponifying odorless Cochin oil with potash, the latter by adding to a coconut oil shampoo about  $2\frac{1}{2}$  per cent. of pine tar.

According to the American Cosmeticians National Assn., 39,000,000 U. S. women spent more than \$200,000,000 on various forms of beauty treatments in 1938.

**Cosmetic Surgery**, that branch of surgery which is concerned with the correction of defects or deformities of the face, either (1) acquired, as the result of trauma, burns, or mutilating operations, or (2) congenital, as hare lip. It is also resorted to for the modification of featural types, as unduly large mouth, excessively upturned nose, etc., and for the eradication of wrinkles. See also RHINOPLASTIC OPERATIONS.

**Cosmic Rays**.—See **Millikan Rays**.

**Cosmogony**, any theory of the origin of the universe. Of creation, in its true sense, there is no trace in any savage scheme of thought; indeed, the gods themselves need to be accounted for—a theogony is the usual prelude to a cosmogony. Hence, the narrative in the Book of Genesis is unique in its portrayal of absolute and majestic omnipotence, no less than for the orderly sequence of the plan it unfolds, and, above all, for the

high ethical purpose underlying its disclosures. Its outlines closely follow the Assyrian legend deciphered by George Smith. The six days of creation appear in both with essentially the same progression of events. The Greeks led the way in the construction of philosophical cosmogonies, based upon pure reason, apart from any guidance by tradition or warrant from ascertained fact. The highest type of such a system, was exhibited in Plato's *Timæus*. The Cartesian philosophy of the 18th century comprised a theory of nature as well as of knowledge, and marked a transition toward the scientific epoch of world building. In cosmogonical speculations, heat, air, atoms with rotatory motions, numbers—have all in turn been recognized as the fountain and causes of things. Of hypotheses as to the formation of our system, and of all similar systems in space, the most notable is that of Laplace, founded on observation of the mutual relations of the planets. Laplace had in some measure been anticipated by Kant. Thus arose the *Nebular Hypothesis*, the evidence for which was carefully marshalled by Sir William Herschel.

Following up this view of a formation of the planetary globes by natural causes, there have been speculations as to the commencement and progress of organic life upon them, and communication of it from one planet to another, notably by Lord Kelvin. Darwin's work has completely altered the face of biological research and theory. See **EVOLUTION**; **DARWINISM**; **SPENCER**.

**Cosmopolitan**, a 'citizen of the world'; one whose sympathies and tastes are catholic.

**Cosmos**. See **Cosmogony**.

**Cosmos**, a genus of perennial plants belonging to the family *Compositæ*. There are some 20 species, most of which are native to Mexico.

**Coss**, or **Kos**, an Indian measure of distance, varying from  $2\frac{1}{2}$  to  $1\frac{1}{4}$  m., the average distance being 2 m., 4 furlongs, 158 yards.

**Cossa, Luigi** (1831-96), Italian political economist, was born in Milan. Among his works are *Guida allo Studio dell'Economia Politica* and *Primi Elementi di Economia Politica*.

**Cossa, Pietro** (1834-81), Italian dramatic poet, was born in Rome. He achieved his main successes in a series of dramas dealing with stories of ancient and modern Rome, among them, *Nerone*; *Messalina*; *Cleopatra*; *Borgia*.

**Cossack Soviet Republic**. See **Don Cossacks Territory**.















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